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Calfhood Vaccination as an Aid in Coöperative Bang's Disease (=Bovine Brucellosis) Control*

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Washington, D. C.

IN THE COÖPERATIVE campaign against Bang's disease, the test-and-slaughter policy was adopted some six years ago to serve an emergency use in connection with reduction of cattle numbers and also of losses from this infection. Since then the same method has been continued until its use has become rather broadly accepted. Judged from general results obtained, from the satisfaction expressed by large numbers of cattle owners, and from the size of waiting lists, the method has been reasonably effective. Meanwhile there has developed much interest in the possibility of vaccination, particularly calfhood vaccination, as a further means of combating this malady. Especially within the last year results of experimentation and field trials have been widely publicized, frequently with accompanying editorial comment. The encouraging nature of the results obtained under farm conditions as well as in controlled experiments has been a great stimulus to public interest in calfhood vaccination.

We feel that the time is now rapidly approaching when certain decisions must be made. These decisions affect the method or methods which are judged to be best in dealing with Bang's disease under the wide range of conditions present in the United States. Because of the character of its membership, including both research workers and administrative veterinary officials, the United States Live Stock Sanitary Association is conspicuously qualified for weighing the evidence in the case. Basic points of calfhood vaccination are its safety and effectiveness. Although we fortunately live in a democracy where the will of the people is supreme, proper decisions involving biological principles and procedures must necessarily be based on scientific facts rather than on public enthusiasm or wishful thinking.

Besides the scientific phases of the points at issue, certain other aspects in Bang's disease eradication demand contemporary consideration. Such points include orderly procedures of conducting vaccination, possibly on a large scale; systems of record keeping which promise to be rather complex; and the important consideration of expenses and indemnities so as, on the one hand, to deal fairly with livestock owners and, on the other, to protect the public

*From the Bureau of Animal Industry, U. S. Department of Agriculture.

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treasury against costly practices that may result from inadequate foresight.

Having outlined some of the major considerations, it is deemed advisable to review briefly the principal steps in our knowledge of Bang's disease and methods of control and eradication acquired up to the present time. As in the case of other learned sciences, veterinary medicine has its folklore, some of which appears in library publications somewhat to the chagrin of modern, enlightened practitioners. As recently as 1882, we find as a treatment professionally recommended for abortion (in horses, however) the following: "If symptoms of casting chance to be discovered in time, it may be prevented by promptly burning pigeon feathers . . . on a pan of coals and holding them so that she will be obliged to inhale the smoke." In more modern times there have been waves of enthusiasm and hope based on the alleged effectiveness of certain so-called specifics. But the ineffectiveness of such methods must not be allowed to destroy our faith in the resourcefulness of veterinary science in developing dependable means of preventing bovine brucellosis. Such a means gives added strength to our attack on the malady just as a good left hand, as well as a powerful right, aids in fistic combat. We have, therefore, assembled pertinent facts which we trust may contribute to the soundness of the decisions to be made.

John R. Mohler

CAUSE OF BRUCELLOSIS REPORTED IN 1896

The discovery of the causative organism of Bang's disease, or bovine brucellosis, was reported by Bang and Stribolt in Denmark in 1896. At that time the disease was widespread throughout European countries. It is apparent from early reports that contagious abortion of cattle, as it was then known, existed in the United States even prior to 1896. In the early years of the 20th century, cultural studies of organisms recovered from aborting cattle in various scattered herds throughout this country were made by Mohler and Traum in the Bureau of Animal Industry and identified as the Bang's bacillus.

In 1911, Schroeder and Cotton reported that samples of market milk sold in the District of Columbia, on injection into guinea pigs, caused tubercle-like lesions from which a minute organism could be recovered in pure culture and this was later identified as the contagious abortion bacillus. The frequent occurrence of this bacillus in cows' milk and the similarity of the biological aspects of this organism to that producing Malta fever in goats, as well as in man, caused Eichhorn, then chief of the Bureau's Pathological Division, to ponder over the possibility of the former being a factor in public health. He, therefore, suggested to Alice Evans, who also was employed at that time by the Bureau, a comparative study of the organisms affecting these two species of milk animals. This suggestion was followed by Evans in 1917 and in the ensuing year she definitely established the relationship of *Bacterium abortus* with *Micrococcus melitensis* of undulant (Malta) fever. These and similar findings provided the stimulus for active and intensive investigation of what we now term Bang's disease or brucellosis of cattle, not only by the Bureau of Animal Industry, but also by various other research laboratories in the United States and other countries.

Little has been added to our knowledge of the nature of Bang's disease since the early days of its study. The discovery of definite and practical means of prevention, treatment or cure has been more or less elusive in spite of all efforts spent in this connection during the past 30 years. All known methods of disease control, including (1) chemotherapy, (2) sanitary control, (3) the test-and-slaughter method, and (4) vaccines, bacterins and immune serum, have been tried and evaluated. With the excep-

tion of chemotherapy, these methods possess virtue to various degrees, and it is believed that the knowledge, accumulated through these years of trial of the various expedients, leads us to hope that we have reached the threshold where definite means of preventing and controlling and thereby eradicating brucellosis of cattle may be combined and placed in actual practice.

CHEMOTHERAPY

Probably the most interesting, if the least profitable, of the methods studied in connection with Bang's disease has been the use of drugs and chemicals in the treatment of infected animals. The discovery that quinine is effective in treating malaria, and that arsenicals can be used in syphilis, stimulated chemotherapy in connection with practically all diseases, both human and animal. The fact that all drug treatment in connection with Bang's disease has thus far proved ineffective should not be held as a criticism of the efforts made, as the hope is still present, in spite of repeated failure, that some drug or combination of drugs may be found that will cure cattle actively or chronically affected with brucellosis.

Among the earliest of the chemical treatments was carbolic acid, first suggested by Bräuer of Germany in 1884, and later by many other European veterinarians. In our notes on practice delivered by Leonard Pearson early in 1896 before Bang's discovery of *Brucellus abortus* had been announced, the following statement appears: "It is recommended to give subcutaneous injections of two drams of a 2% solution of carbolic acid every 10 days from the second month after abortion until two weeks before the time for the birth of the next calf."

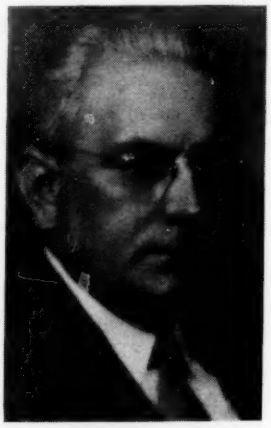
A number of experiment station bulletins and articles by Taylor, Nelson and many others were issued in the early part of this century advocating the subcutaneous injection of carbolic acid as well as the feeding of several ounces daily of dilutions of the drug for months at a time. Later it was commercialized by Roberts of Wisconsin who distributed it in a disguised form as an anti-abortion serum for preventing and curing abortion in cows. Circular 29 of the Department of Agriculture, issued in 1909, showed that an analysis of this product proved it was not a serum and contained no serum. Instead it consisted of 98 per cent of water, 2 per cent of carbolic acid and a slight quantity of oil of cloves to give it a serum-like color. Many users of carbolic acid in various forms believed that beneficial results were obtained, but under controlled experiments it was found to have insufficient value to warrant its use as a curative agent. One amazing factor in this connection was the tolerance the cow was shown to have for this drug.

In 1913, Rich of the Vermont Experiment Station advocated methylene blue as a remedy and during the following two years the normal coloring of many barnyards and stable floors and walls was changed to blue, but the abortion bacilli in the treated animals lived on. During the succeeding years, report after report followed on the use of various drugs — iodine in the forms of potassium iodide and colloidal iodine, arsphenamine, urotropin, chloroform vapor infusions of the udder, collargol, butyl chloride, trypan blue, thionine, methyl violet, crystal violet, sodium cacodylate, hydrochloric acid, formaldehyde, and mercurochrome being the most prominent of the numerous drugs tried. Acriflavine, due to its supposed selective action on the genital organs, was hailed as a curative agent, and Edwards and Coffman, in 1926, claimed to have secured successful results with it. These claims, however, could not be confirmed by Huddleson, Graham and Thorp, and Cotton and Buck. Just recently sulfanilamide and other sulfonamide derivatives have been shown to be effective in treating certain infectious diseases in man,

A. E. Wight

and, indeed, have been reported by some physicians as beneficial in human brucellosis. Sulfanilamide, however, was tried by the Bureau, but was found to have no effect in reducing *Br. abortus* either in virulence or numbers in the infected cow's udder.

The promise held forth in preliminary reports on various drugs in curing Bang's disease has had an aftermath in the patent-medicine field and quackery. So-called abortion cures have gained popularity among livestock owners in various sections because they have been used during a period when the herd disease was becoming quiescent. The most difficult to suppress of these "cures" were two: one whose principal ingredient was cornstarch, and the other, brown sugar. The Bureau, alone and in connection with other governmental agencies, has been successful in suppressing the activities of many of these illegitimate "Bang's remedy" concerns.



H. M. O'Rear

SANITARY PROCEDURES IN HERD MANAGEMENT

It was early demonstrated that brucellosis in cattle is primarily a disease of the pregnant uterus and that exposure of normal cattle occurs principally following an abortion or normal parturition from the uterine discharges of an infected animal. From this knowledge evolved the practice of separating pregnant animals from the herd at the time of parturition or signs of impending abortion, and keeping them in maternity stalls until uterine discharges ceased. If no animals were added to the herd from outside sources, a herd resistance is acquired to the infection, which, together with other sanitary precautions, keeps the infection in a quiescent state, and in many instances eradication of the disease has been accomplished. This method of control has been used effectively for many years in several states.

Another method of control along somewhat similar herd-management lines is the segregation method. This consists in separating the reacting from the nonreacting animals, and the gradual elimination of the reactors on account of poor production or age. Many herds have been freed from infection in this manner, but the method is practical only in exceptional herds.

The cardinal principle in connection with herd management is the suppression of exposure, and this principle is essential in all methods of control.

THE TEST-AND-SLAUGHTER METHOD

The work in connection with the control and eradication of Bang's disease under the plan of testing cattle and eliminating reactors was started coöperatively by the federal government and the various states in July 1934, and began as a reduction-of-surplus-cattle program at the urgent request of many livestock owners. The benefits resulting from this campaign have been set forth in Miscellaneous Publication No. 384 of the Department of Agriculture. This publication, which is available for distribution, does not contain any reference to calfhood vaccination because that subject has been and will be covered in other publications. In putting the test-and-slaughter method into operation the personnel and equipment of the Tuberculosis Eradication Division of the Bureau of Animal Industry were used. This project necessitated the establishment of many testing laboratories, the training of personnel in laboratory technic, blood drawing, and keeping of records, and many other details—altogether a formidable program to place in smooth running condition. The results have been gratifying and thousands of herds have been freed of infection. The incidence of infection in every state coöperating has been reduced. Since July 1, 1939, all antigen used in this program has been produced by the Bureau, and this factor has resulted in a greater uniformity in the interpretation of the test.

On April 1, 1940, there were 268 counties in the modified accredited Bang's disease-free area, and since that time 78 additional counties have been placed in that area, making a total of 346 counties, located in 20 states. These modified accredited counties, which are 11.3 per cent of the total counties in the United States, have a combined cattle population of approximately 2,942,500 exclusive of steers and calves less than 6 months of age. November 1, 1940, testing on an area basis was being conducted in about 220 counties in 25 states in addition to the 346 accredited.

During the last fiscal year the federal government spent about $2,218,000 for indemnity payments to owners for cattle condemned on account of reacting to the Bang's disease test, and during the same period the states spent about $2,500,000 for the same purpose. The operating expenses of the federal government amounted to about $2,228,500 and those of the states to about $465,000.

In almost all the states, provisions have been made for accrediting individual herds of cattle as free from Bang's disease, and on April 1, 1940, there were 61,654 state-accredited herds, containing 1,174,191 cattle, in the Bang's disease project. This number has been increased since that time.

From the above it will be observed that much progress has been made in the control and eradication of Bang's disease in cattle in this country through the coöperative work conducted under the provisions of the test-and-slaughter plan since July 1934. The provisions of this plan will undoubtedly be continued in the future, but as will be indicated later in this report the Bureau is prepared to approve a suitable plan that will incorporate the vaccination of calves at the proper age as an adjunct to it.

BACTERIN, VACCINE AND IMMUNE SERUM THERAPY

In the early investigations of Bang's disease by the Bureau of Animal Industry, which were actively begun about 1910, bacterins and vaccines were tried.

Bacterin prepared from heated carbolized cultures of *Br. abortus* was first used as a curative agent in infected cattle, but very little, if any, benefit resulted. Later it was used in repeated doses in adult animals as a preventive, but no serviceable degree of immunity could be measured. Bacterins were soon discarded.

Immune serum was tried in several infected herds, but it, likewise, was found ineffective in altering the course of the disease.

Living Brucella organisms were early shown to increase markedly the resistance of normal cattle to subsequent exposure, and investigations in their use were carried out by a number of veterinary research laboratories in various parts of the world. Avirulent strains, strains of reduced virulence and fully virulent strains were used in infected herds, and the reports during the succeeding years contained claims of successful vaccination with various vaccines used. It was found that vaccines of no kind had any curative effect in infected cattle, and, also, from a standpoint of prevention, the resistance induced was closely correlated to the virulence of the strain used.

In 1916, the British Board of Agriculture and Fisheries recommended the vaccination two months before breeding of all open, nonreacting cows in infected herds with fully virulent strains of *Br. abortus*. This method was accepted by many as the most favorable use of vaccine and was accordingly practiced in a number of European countries. Confirmations of favorable results obtained with virulent cultures in open cattle were reported in this country by Smith and Little, and Hart and Traum, and in Europe by Stockman and the German Imperial Board of Health. Commercial biological concerns in this country were, therefore, licensed to distribute such vaccine and it was extensively used. Later studies by the Bureau of vaccination with virulent cultures in open adult animals showed that in many instances the vaccine localized in the udder and that such animals were made chronic carriers of the organism.

CALFHOOD VACCINATION

Schroeder and Cotton, Buck, and later Cotton and Buck, in the Bureau of Animal Industry, studied vaccination with aviru-

lent, attenuated and virulent strains of *Br. abortus* for many years. In 1925, Buck tested the virulence of many laboratory cultures of *Br. abortus* in his possession and one of these was strain 19. In cattle tests with this strain, it was found that it produced a serviceable immunity and that, unlike fully virulent cultures, it did not localize in the udder.

Before 1925, vaccination was frequently advocated in open adult animals and heifers two months before breeding. But it was Buck who in that year began his first experiments in the vaccination of calves, at which time he injected a group between 5 and 6 months of age with fully virulent Brucella organisms and exposed them during their first pregnancy, with a group of controls. This was undoubtedly one of the best demonstrations of effective vaccination against Bang's disease, as all the vaccinated animals resisted an exposure that caused abortion in all but one of the controls. Following this experiment, Cotton and Buck made a number of experiments in calfhood vaccination with strain 19, an organism of reduced virulence. A total of 70 calves between 4 and 8 months of age were vaccinated of which only 8 (11.4 per cent) became infected, following severe exposure during first pregnancy, but only one abortion occurred that could be traced to *Br. abortus*. Of 73 control animals, 57 (78 per cent) became infected, of which 55 (75 per cent) aborted.

Tests made of commercial vaccine in 1932 showed that the products were of various degrees of viability and virulence. Some vaccines included virulent strains of *Br. suis*, the swine species, which had been proved to be capable of localizing in the udder of cows. Recognizing the danger of spreading Brucella infection among cattle and also in man through the dispersal of virulent bovine and swine species of Brucella vaccines, the Bureau of Animal Industry, in 1932, changed its regulation relative to this product and all commercial concerns were required to use only those cultures of *Br. abortus* that were nonvirulent or of such low virulence as to be acceptable to the Bureau.

Studies of strain 19 have disclosed variations in the antigenicity of these cultures due to dissociation. This has been recognized as an important factor in its immunizing action. Therefore, in the preparation of efficient vaccine, only such cultures of strain 19 should be used which on laboratory test prove suitable for this purpose. Such tested cultures are being supplied periodically to all laboratories engaged in the production of Brucella vaccine. Since the beginning of our tests on commercially produced vaccine in 1936, condemnations of serial batches have been reduced from 32.3 to 8.5 per cent and only vaccines which meet our rigid requirements for viability, purity and antigenicity are released for distribution.

FIELD TESTS OF CALFHOOD VACCINATION

Of all the diseases with which we are familiar, Bang's disease, for reasons previously mentioned, is the most difficult to show the relative merit of any form of treatment. In our anxiety to seek relief from its ravages we are apt to grasp at any straw with the hope that it may prove a specific. The use of vaccine for calves is no exception to the rule, and it was with this knowledge before us that we adopted almost five years ago a long-term program of investigation before we would attempt to draw any definite conclusions as to its efficiency. This study began in January 1936 with strain 19 in approximately 260 infected herds in 24 states and was based on the encouraging facts obtained in station-controlled experiments. The results of these trials covering this period, in which over 17,000 calves between 5 and 7 months of age were vaccinated up to December 1, 1940, have been compiled to indicate the trend in this study, and will be presented in detail later today in mimeographed form. However, a brief summary of this information is as follows:

Of the calves vaccinated, 8,182 have now dropped calves involving three pregnancies, of which 5,673 were first, 2,026 were second and 483 were third pregnancies.

There were 7,872, or 96.2 per cent, normal parturitions in these herds. Of the

latter number, 6,526, or 82.9 per cent, calved normally and also were negative on post-parturition test; 399, or 5.1 per cent, calved normally but were positive to the post-parturition test; and 947, or 12 per cent, calved normally and were suspicious to the post-parturition test.

On the other hand 310, or 3.8 per cent, abortions occurred in these groups, of which 182, or 58.7 per cent, of the aborting animals were negative to the post-parturition test and 99, or 31.9 per cent, were positive to this test, while 29, or 9.3 per cent, of the aborting animals were pronounced suspicious. Consequently, on the basis of the blood-agglutination test, only 128, or 1.6 per cent, of the abortions occurring in this group of 8,182 animals involved in the three pregnancies could be attributed to brucellosis.

We have another group of 44 of these vaccinated animals which have passed their fourth parturition, but the number is too small to be of much significance, although it is mentioned for whatever value it may possess. Of this group, 41, or 93.2 per cent, calved normally, while 3, or 6.8 per cent, aborted, 2 of the latter being negative to the blood test and 1 positive. In other words, 2.3 per cent of the 44 animals aborted and also reacted to the blood test.

It may be pointed out that among 1,346 animals that calved normally and revealed a positive or suspicious titer, approximately 500, or 37 per cent, gave a negative reaction to the first retest applied six months later. In the first group of 97 animals that calved normally during the first pregnancy and disclosed a suspicious or positive titer, the fifth retest applied 2½ years later indicated that 75, or 77.3 per cent, of these animals had returned to a negative titer.

Although it is naturally desirable in trials of this character to determine the length of time that animals which aborted and revealed a titer might continue to react to the test, it has been extremely difficult to persuade owners to retain such animals longer than an average of two subsequent retests. In most cases their personal interest apparently takes precedence over the experimental importance of the work. Attention is directed to the fact that some animals in all groups that revealed a reaction to the post-parturition test, following the second, third and fourth pregnancies, in reality reacted to the post-parturition test following the first pregnancy and have not since lost their titers. However, the number of such animals is relatively small considering the total number of animals involved.

Exacting Rules and Regulations Necessary for Success

In considering the possibilities of *Br. abortus* vaccine in the control and eradication of this malady, it should be readily recognized as a procedure that is not sufficiently simple in application to withstand promiscuous usage, and if viewed solely on a basis of simplicity, disappointment and disaster are bound to follow in its wake. Consequently it is apparent at this juncture that a warning should be sounded against any over-enthusiastic tendencies which obviate or subordinate cardinal principles that are of fundamental importance in a procedure of this particular type. Exacting rules and regulations will be required to govern its use, and a definite plan must be adopted with respect to the physical application of these principles, in addition to a close supervision of the preparation of the product, if any major degree of success is to be achieved and complications which tend only to confuse the situation are to be avoided.

This project was conducted as a coöperative proposition in privately owned herds, creating a situation that precluded the usual experimental procedure of maintaining control animals. Therefore, it was obvious, under such circumstances, that the herds to be selected must be chosen from those in which the disease, as determined by the blood-agglutination test, was present in a sufficient number of animals in each herd to insure adequate exposure of the vaccinated animals to the disease. As a means to this end it was agreed that no herd would be accepted unless at least 15 per cent of the animals in the herd gave a positive reaction to the test. Upon applica-

tion of the agglutination test, however, it was disclosed that these herds actually contained 5,531, or 29.2 per cent, positive reactors, and 1,593, or 8.4 per cent, suspects. All animals were properly identified and the reactors and suspects were retained in their respective herds for exposure purposes, after which the practice was adopted of eliminating a few each year as vaccinated animals came into production and served as replacements.

It is well to bear in mind that the main object in this particular study has been to establish, if possible, by means of calfhood vaccinations with *Br. abortus* vaccine and without segregation, herds composed of immunized, negative animals to replace the original herds which were rather extensively infected at the beginning of the experiment. It also is important to remember that these herds are individually owned and maintained as such on privately operated farms under the economic practices usually employed in the management of cattle on the average farm, where in most instances the monetary factor is of paramount importance in the enterprise. Therefore, it is utterly impossible under such circumstances to exercise the same control in every instance that would ordinarily prevail in a similar study under the regular routine procedure of a station-controlled experiment. A considerable number of persons are necessarily involved in these trials, and the scope of the study would naturally suggest that these herds are maintained under a wide margin of variable conditions. Even in view of this situation, it has been possible to establish and maintain a degree of uniformity and rigidity which, it is believed, could yield results in an experiment of this type that would be reasonably accurate and dependable. The usual sanitary practices employed in animal-disease control and eradication were not applied in these herds and the only means resorted to in an effort to control and eradicate the disease was calfhood vaccination.

On July 1, 1940, 24.1 per cent of the original reactors and 21 per cent of the suspects still remained in these herds, a number of these cattle having aborted each year. It is readily apparent, therefore, that the vaccinated animals in these herds, which were in no manner segregated, have been subjected to a severe natural exposure, while in direct contact with these diseased animals. In reviewing the incidence of brucellosis in these herds, however, another matter of interest is noted in the fact that following blood tests made during July 1939, 3½ years after the project was launched, 387, or 7 per cent, of the original positive reactors were then negative to these tests.

COMPLIANCE WITH CITY AND STATE REQUIREMENTS

Dairymen who seek the vaccination of their adult cattle with or without the vaccination of their calves should be warned that the number of city and town health officers who are requiring milk from nonreacting cattle for their citizens is constantly on the increase. Too frequently we have learned that such owners have been deprived of their markets because their vaccinated cows had continued to react following vaccination. Moreover, regulations in a number of states require that cattle destined to such states must not be reactors to the blood test. Therefore, shippers of both dairy and beef cattle should be properly advised against promiscuous vaccination without supervision before they risk shipments in violation of the regulations of the state at destination.

PROPOSED POLICY INVOLVING OFFICIAL RECOGNITION OF CALFHOOD VACCINATION

As a result of disturbed world conditions sanitary officials in many states, as well as the federal government, are confronted with a problem of considerable proportions. The threat of an extended diversion of funds, ordinarily available for peacetime government functions but now required to meet the exigency of total preparedness, one of the gravest and most impelling problems of all America today, is an ever-increasing probability. Under the extraordinary circumstances presented by this situation and in view of the possibilities of *Br. abortus*

vaccine as an aid in the control of brucellosis, it appears desirable to amend the present program to include calfhood vaccination as an adjunct to the test-and-slaughter method, in those states where this procedure is desired.

An operative program to carry this procedure into effect should be simple and uncomplicated, and the following general plan is proposed for this purpose:

1) All animals over 6 months of age in a herd under coöperative supervision, where the owner elects to adopt the vaccinal procedure, should be subjected to a blood-agglutination test prior to the inauguration of such a program, and at least one test annually should be applied thereafter.

2) To facilitate matters in connection with the movement of animals in such herds, in addition to protection of the purchaser, a simple, uncomplicated record of each herd must be kept.

3) The vaccination of all animals should be confined to calves between 4 and 8 months of age and this should be accomplished as nearly as possible during the sixth month of the animal's life.

4) The age of the animal and date of vaccination should be properly recorded and the identity of each animal should be properly established in each instance.

5) An animal in a herd where vaccination is practiced should not be disposed of for any purpose other than immediate slaughter while revealing a positive titer, except upon written permission by the coöperating state or Bureau officials.

6) A herd under the vaccinal plan may be certified as a herd free of brucellosis for a period of one year when all animals in the herd over two years of age reveal at least two negative reactions to official blood-agglutination tests properly spaced, when nonvaccinated heifers under 2 years shall similarly be proved negative to the test and when vaccinated heifers under 2 years either show a satisfactory decline in titer or are removed for slaughter.

7) The subject of the joint payment of indemnity to owners of adult cattle that reveal a positive reaction to the blood-agglutination test in a herd under the vaccinal procedure is a matter that should depend upon the circumstances within a state. However, in instances where vaccinated animals over 2½ years of age (that were vaccinated between 4 and 8 months of age) disclose a positive reaction and the owner desires to dispose of such animals, a joint payment of indemnity is recommended.

8) Owing to a variation of conditions in different states it appears, except for a general operative plan of procedure, that minor details in a program of this character should be delegated to the coöperating state and federal officials in each of the various states.

9) It must be appreciated that one method by itself may not be applicable to all types of herds. In some herds the disease must be eradicated as soon as possible in order that the herd may be maintained on a paying basis. In other herds, another method may be considered a more profitable and, therefore, a preferable procedure. In still other herds, a combination of methods may work as the best solution of the Bang's disease problem. The livestock officials in the individual states, governed by the desires of individual stock owners, should assume the responsibility of determining the manner in which their respective interests can best be served. Naturally these officials have the privilege of (1) continuing the test-and-slaughter method, (2) adopting calfhood vaccination as herein outlined, or (3) using the latter as an aid by integrating it with the test-and-slaughter method. In other words, those who are two-fisted may prefer to use both fists and not have one handcuffed. When the Bureau is acquainted with the desires of the various states, its duty will be to coöperate to its fullest extent with those which express a desire to suppress this malady in their respective domains along any of the three lines mentioned.

Earthworms numbering some 50,000 per acre in rich, cultivated land are said to bring 10 tons of valuable ingredients from the subsoil annually.

Some of the Radio Addresses of the Washington Session*

Military Horses and Mules†

GERMANY used a great many horses in the invasion of Poland. Quoting from a German magazine: "We may state without exaggeration that the rapid advance of the German army into Poland would have been impossible without horses. Each of our infantry regiments has approximately 500 horses and our artillery is horse drawn. Germany used more than 200,000 horses in the campaign in Poland."

The German army relied largely upon horses in the move of the heavy guns during the invasion of Belgium. The first pictures of the occupation of Paris showed German soldiers on horseback on the Champs Élysées. And, of course, the artillery of the French and Belgians were largely drawn by horses. There were dogs also. I am reliably informed that Germany has more than 100,000 dogs in its military organization. These are used as patrol, sentinel, service and transport animals. France, Russia and Japan use dogs in large numbers in their armies.

Cassius Way

The United States has 35,000 in the Regular Army and National Guard. The veterinary corps provides care, treatment, evacuation and hospitalization of sick and wounded animals. This important branch of the service is being expanded along with the other branches of the military forces.

In addition the address drew attention to the part the veterinary profession takes in the care and production of the food-producing animals—cattle, swine, sheep, poultry—which insure an amplitude of food for the people and their armies in time of war. "Nothing is more important to the nation in war or peace than the health of its domestic animals," Dr. Way declared. Moreover, attention was invited to the cow as the "foster mother" of mankind, the almost complete task of eradicating bovine tuberculosis, the discoveries of the U. S. Bureau of Animal Industry which led to an understanding of insect-borne infections in man and animals, and the conquest of other animal diseases important to national wealth.

The broadcast referred also to the rabies problem, to the importance of small animal practice and to the testing of commercial dog foods.

The Future of Veterinary Science*

As agriculture is the basis of wealth and the veterinary profession safeguards the live stock which is the cornerstone of agriculture, the veterinary profession has a great responsibility to the nation and especially to the farmer. While it is difficult to look into the future, there are certain broad trends of veterinary science which should make predictions not too difficult. One of these trends is toward the research spirit dominating the majority of men in veterinary medicine. The Twelfth International Veterinary Congress prize was awarded this year to I. Forest Huddleson, research pathologist of Michigan State College, for his contributions to the knowledge of brucellosis which are of inestimable value to the livestock industry and in protecting human health.

THE UNSOLVED PROBLEMS

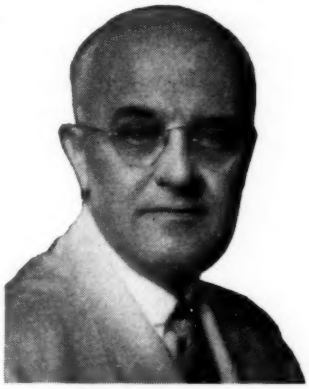
There are still many problems to be solved. Among these are bovine brucel-

*Excerpt from a radio address by H. W. Jakeman during the Washington session.

*Owing to the tremendous amount of material broadcast during the 77th annual meeting held in Washington, D. C., August 26-30, 1940 (mainly in the form of questions and answers) space does not permit the publication of the manuscripts in full. Attempt has, however, been made to bring out the salient points contained in these nationwide broadcasts of the labors of the veterinary service.—*Editor.*

†Excerpt from a radio address by President Cassius Way during the Washington session.

losis and mastitis, equine encephalomyelitis and a number of parasitic diseases. . . . Unfortunately, the civilizing of man and the domesticating of animals create new diseases which take the place of the old ones that have been controlled. Veterinary research has already made major contributions to the farmers' economic welfare. The losses from diseases of farm animals suffered by farmers are high, but in addition to eradicating diseases veterinary science aids the farmer in other ways.



H. W. Jakeman

Nutritionalists declare that the American people would need twice the number of cows we now have were the people to consume the amount of milk they should to maintain good health. If research could increase the per capita milk yield of cows, the cost of producing a given amount of milk would be lowered. Then, were it found impossible to increase the size and quality of male dairy calves so that they would approximate the beef breeds, the dairy farmer would benefit a great deal. This seems to be within the realm of possibility. Moreover, veterinary research may lead to the determination of sex. It does not require much calculating to figure the benefit both the farmer and milk consumer would derive if 75 per cent of the calves born were females. Our research is working toward these ends.

Diseases Transmitted to Man

The more common diseases transmitted to man are brucellosis (undulant fever), mammary infections, rabies, anthrax and trichinosis. The eradication of bovine tuberculosis has lowered the occurrence of the glandular form of the disease in children. Research will no doubt solve the problem of other diseases transmitted to man by animals, and perhaps reveal the nature of certain human diseases that remain unknown.

The Veterinary Service*

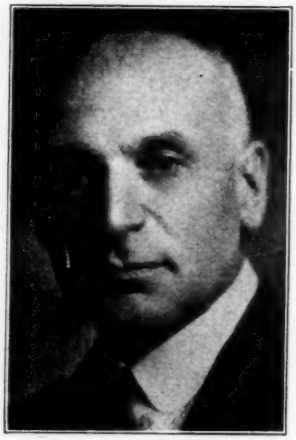
In answer to the inference that veterinarians must "feel somewhat out of the swing of things in this war," the speaker declared that while powerful mechanized units aided Germany in conquering so much of Europe, she used approximately 791,000 horses and mules in her armies at the recent Battle of France and Flanders: in fact, more horses in proportion to men than in the World War. As in the days of Napoleon an army still travels on its stomach. Animals provide a vitally important means of transportation. . . . Many pictures of the present war show horses in the German forces drawing heavy artillery and machine guns. England and France in the years preceding this war unfortunately discarded horses to a greater extent than Germany, but since last September both of these countries have been purchasing a large number of horses and mules in the United States.

Coöperation Between Canada and the United States

The war has not materially affected the veterinary service of Canada except to increase the inspection of meat and to guard against diseases of live stock. The close coöperation between the U. S. Bureau of Animal Industry and the Canadian Health of Animals Division, and the use of similar methods, are helpful in guarding the health of live stock. Health certificates for the entry of live stock in both countries are interchangeable. Both countries enforce stringent regulations on the entrance of disease from foreign countries. These apply to products of animal origin as well as to live animals. Such commodities as

*Excerpt from a radio address by A. E. Cameron, veterinary director general of the Dominion of Canada, during the Washington session.

hides, skins, hair, etc., which may carry infections are rigidly inspected, as well as grain, millfeed, hay, straw and other products of the soil. In the case of meat or meat products, when one sees the legend "Canada approved" that indicates that they have been prepared under official supervision and are wholesome. Canada's meat-inspection system is similar to that of the United States. All meat and meat products for export from one province to another or out of Canada must have passed inspection by veterinarians of the Health of Animals Division. There are 500 veterinarians engaged for this service.



A. E. Cameron

VETERINARY SERVICE CENTRALIZED

The control of reportable diseases is centralized in Canada. There is a chief veterinary inspector and two associate chief veterinary inspectors, and a district veterinary inspector is in charge of each district, which is usually a province. Since the federal regulations supersede those of other authorities, the provincial governments take no action with scheduled diseases, but leave the responsibility to the Dominion government.

NO RABIES IN CANADA

None of the serious diseases and plagues of animals exists in Canada. We have no foot-and-mouth disease, no glanders, no sheep scabies and no rabies at this time. When rabies occurs, it is eradicated by strict quarantine and destroying known contacts and stray dogs. The American Veterinary Medical Association is taking a keen interest in rabies this week. A resolution will be adopted that should be of great interest to the lovers of dogs all over North America. During the convention new methods of safeguarding the health of America's food and work and army animals are being revealed.

CONVENTION REGISTRANTS

Leading bacteriologists, parasitologists, surgeons and educators, as well as practitioners, are taking part in the convention. The meetings provide an excellent opportunity for men all over North America to exchange opinions on the elimination of animal diseases and discuss the new methods they have discovered for saving animal life. The new knowledge will save millions of dollars of farm income and the death of countless pets. . . . Some 75 scientific papers and addresses have been delivered by outstanding veterinarians of the United States, Canada and Hawaii on diseases of farm animals and pets. . . . The Grand Ballroom of the Mayflower, where presidents, ambassadors and other world notables have spoken, will be taken over for horses, cows, dogs and other domestic animals, and there the newest methods of veterinary science will be demonstrated—methods whereby the lives of thousands of animals are saved annually. There will also be a demonstration at Fort Myer under the direction of the veterinary corps of the army and at the research laboratory of the Bureau of Animal Industry at Beltsville, Md.

EXHIBITS: COMMERCIAL AND EDUCATIONAL

The commercial exhibits at the Mayflower represent the progress made in the cure of disease. Without the aid of the commercial units, the profession would be at a loss.

The educational exhibits largely center around the veterinary activities of the Bureau of Animal Industry, U. S. Department of Agriculture, Federal Security Agency, Department of the Interior and other units of the federal government. John R. Mohler, chief of the Bureau of Animal Industry, who has charge of local arrangements, has done a good job.

THEN AND NOW

About 2,000 veterinarians and their families are registered at the Mayflower. When the Association met at the Willard Hotel in 1891, or 49 years ago, the registration was 75. The membership of the Association in 1891 was around 200. Today it is 6,200. It was founded in New York City, 77 years ago, during the War Between the States, at a time when a great war was calling attention to the need of a veterinary service which, until then, had not been established. The Army of the Potomac was losing 500 horses daily and the forces in Tennessee 150 a day. Besides diseases of farm animals were not being systematically controlled. Today, there is another great war across the sea.

The speaker told forcibly of such achievements as the control of Texas fever, bovine tuberculosis eradication, elimination of foot-and-mouth disease, and Stader's invention of a fracture splint.

The Russian famine following 1917 was pointed out as one of the dangers of curtailing the veterinary service, as the result is always famine and pestilence. The cause was replacing qualified veterinarians with unqualified laymen due to lack of general understanding of the work the veterinary profession does.

The Radio Pet Clinic

This program gave advice concerning many of the everyday problems confronting pet owners. Questions were asked by boys and girls, as well as by the announcer. They were answered by D. A. Eastman of Miami, Fla., Gerry B. Schnelle of Boston, Mass., and M. L. Morris of New Brunswick, N. J.

Among the subjects discussed were the bathing of cats, sore ears in Spaniels, ear mites of cats, skunks as pets, fresh, cool water for dogs, automobile injuries, dogs' teeth, the dog flea, skin diseases and sweets for dogs. The broadcast was concluded with informative material regarding the American Animal Hospital Association and the American Veterinary Medical Association.

Of this part of the convention radio series, M. L. Morris says: "Such programs are valuable to neutralize some of the misinformation which is so widely disseminated through the press and over the radio today regarding the feeding and care of pet animals."

Poultry-Disease Broadcast*

In general, the history of poultry-disease control is about the same as that of other animals. Early scientists, including Pasteur, worked with diseases of chickens, but it was not until poultry earned a billion dollars a year [in this country] that it attracted universal attention from both veterinary investigators and practitioners. The speaker stated that in California, where specialized poultry farming began in this country, it was his privilege to practice poultry medicine exclusively from 1923 to 1935. There were and still are more than a million chickens in each of several California counties. Petaluma is the home of modern incubation that has replaced the sitting hens which, but a few years ago, were generally known as barnyard fowls. . . .The hen has become an egg factory. . . . Engineers say that when machines are speeded up, they require much more attention and service than when idling along at a minimum rate. Instead of laying 20 to 40 eggs a year, the modern hen lays 200 to 300. Her biological machinery has been geared up eight to ten times faster than that of her ancestors of a few years ago.

Cliff Carpenter

DISEASE INCREASED

In years gone by, farmers suffered but little inconvenience from poultry diseases. The machine was idling under natural conditions. Now with a much faster pace,

*Excerpt from a radio address by Cliff Carpenter during the Washington session.

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with layers confined in houses and sometimes cages containing but one hen each, with manufactured food brought to them instead of scratching for a living, disease problems have arisen which often threaten the year's profit.

ADVANCES MADE

Veterinary scientists have scored triumph after triumph in discovering and perfecting methods of prevention and control of such diseases as fowl pox, laryngotracheitis, coccidiosis and other parasitic diseases. Timely vaccination of a flock of 1,000 pullets against fowl pox may avoid the loss of several hundred dollars worth of eggs during the fall and winter months.

Pullorum disease, which once threatened to wipe out the general farm flock, has been brought under control by the application of veterinary science.

Blackhead virtually drove the turkey industry from New England to the Middlewest early in this century, but now, due to methods of rearing developed through veterinary research, turkeys are secure in any part of the country, and with the application of this knowledge blackhead is no longer a menace.

The control of many poultry diseases on specialized farms has become a matter of routine. Recognized methods of disinfection, fumigation and other sanitary measures have gone a long way in avoiding unnecessary losses in the hatchery, brooder and laying house.

The general farmer whose poultry is but another economic unit of his farm-animal population along with sheep, swine and cattle, has not kept pace with the specialized poultry farm in controlling the diseases of poultry. . . . Conditions are improving. The general practitioner not long ago had little reason to study poultry diseases and less opportunity to practice the control of poultry diseases. Today with 90 per cent of the nation's poultry in small flocks on the general farm, the veterinarian is rapidly becoming the custodian of the hen's health. Poultry practice is taking its place alongside of the older fields of animal medicine.

We [the special Committee on Poultry Diseases] recommended a gradual lowering of the percentage of reactors in pullorum disease control of the National Poultry Improvement Plan and the addition of a veterinarian—well qualified in poultry medicine—to the staff of coördinators.

SCHOOLS SUGGESTED

State universities and agricultural colleges have been persuaded to provide extension classes for graduate veterinarians to afford them the opportunity to keep abreast of the latest findings in poultry-disease practice. This is the youngest branch of veterinary medicine and it serves a larger number of farmers and cares for more individual animals than any of the other branches. . . . Poultry adequately housed, fed and hatched from sturdy parents promises shortly to capture the title of mortgage lifter from the hog.

Bang's Disease Broadcast*

Recommendations were made concerning the test requirement for interstate traffic in cattle that should go a long way toward eliminating the confusion and justifiable irritation on the part of cattle owners. While the situation is not bad, there is room for improvement. It was emphasized that a single test is not entirely adequate for such purposes. The individual animal in each diseased herd may show a negative test and yet be diseased if the test is conducted soon after the animal acquires the disease and before enough time has elapsed for the disease to progress to the stage where it will react to the test.

C. R. Donham

*Excerpt from a radio address by C. R. Donham during the Washington session.

SIMILAR TO OTHER DISEASES

The same condition exists in the early stages of all other diseases. However, cattle owners frequently have not understood this situation and, therefore, have been inclined to build up an ill-founded sense of security in the purchase of cattle. They have quite naturally assumed that cattle fit to enter their state are fit to enter their clean herds, and this is not necessarily true.

REVACCINATION

The Committee [on Bang's disease] sets down the facts of this situation [vaccination] as far as they are known and enumerates the virtues and limitations of this method. The intent is to set down the conditions most favorable to the success of this procedure and also act as a guide to avoid the improper use of the vaccine.

At this time, the use of vaccine is generally considered to have merit in calves 4 to 8 months of age as a supplementary procedure to the federal-state control program, not as a substitute for it. The Committee has recommended "that steps be taken by the various states to provide recognition for certified, negative vaccinated herds whenever there are those who can qualify and suggest definite essentials for such a plan."

With reference to the permanent reaction of vaccinated cattle, the speaker said: "This is true when vaccine is used in mature cattle, but usually not when it is used in young calves 4 to 8 months old. . . . It is likely that the procedure will become part of the official plan for the control of Bang's disease in the near future.

Broadcast on Tuberculosis Eradication*

The entire period covering the eradication of bovine tuberculosis in the United States is within the memory and experience of a great many of our livestock sanitary officials and veterinary practitioners. At the end of June 1940, all of the cattle in the United States had been tuberculin-tested one or more times. The number of cattle under the coöperative supervision was approximately 62 million. All but two counties* out of the total of 3,031, Puerto Rico and the Virgin Islands are now modified accredited areas, meaning an incidence below 0.5 per cent. There were 232 million tuberculin tests made and nearly 4 million tuberculous animals were slaughtered. The cost was $273,095,843.42. Of this sum the federal government paid $90,000,000 for indemnities and operating costs. The rest was paid by the states. Only one other country — Canada —has had the courage to tackle this problem. The achievement has won the respect and admiration of most of the civilized countries. Letting down the bars indiscriminately is not advisable. . . . Retesting will be necessary, especially where the incidence of the disease was high and the infection may be lurking, and as the disease is now at a low ebb all cattle may be regarded as highly susceptible.

L. M. Hurt

THE MENACE OF TRUCK TRANSPORTATION AND COMMUNITY SALES

Consideration should be given to transportation since the use of trucks for this purpose extensively is not controlled as satisfactorily as railway transportation. The utmost care must be used as we still have some bovine tuberculosis which may be introduced again in areas free for some time. . . . Considerable headway must be made in bringing community sales under official control or other competent veterinary supervision. Health certificates for all animals except those to be immediately slaughtered should be demanded as there is still the opportunity of offering diseased animals for sale, although faults in this respect are less numerous than formerly.

*Excerpt from a radio address by L. M. Hurt during the Washington session of the Association.

*Kings and Merced counties, California. See December 1940 issue of the JOURNAL, page 637.

However, the opportunity for buyers and shippers to obscure the origin of animals still exists. Animals should be so completely identified that their origin may be readily determined.

TUBERCULOSIS IN OTHER ANIMALS

Eradication was primarily directed to cattle because of the danger of human infection from the consumption of milk and dairy products derived from cows, and because of the greater economic importance of the disease in cattle. Meat valued at approximately $4,000,000 had to be condemned annually. The disease is, however, a serious matter in other animals, mainly hogs and chickens.

Bubonic Plague a Disease of the Future

Although certain species of rodents in the United States are capable of transmitting bubonic plague to man, only 15 human cases are of record in this country. Besides the common rat, the infection is known to exist in ground, red and flying squirrels; wood and kangaroo rats; prairie dogs, marmots, chipmunks and cottontail rabbits. The reason that these infected rodents have not caused more human cases is the sparse human population of the region they inhabit. But, as pointed out editorially in *The Journal of the American Medical Association,* the gradual spread eastward may give rise to explosive epidemics when the infection reaches the rat and human populations of the large cities.

The moral in the councils of veterinary science is that the diseases of man and animals are not independent studies. Because one group of mundane creatures walks upright and the other on all fours does not insulate one from the other in the study of medicine and human welfare. Benjamin Rush of the University of Pennsylvania, in 1806, suggested a chair on comparative medicine in medical schools. On our side is seen the expansion of the veterinary service to wildlife, to captive wild animals, and to the breeding of fur-bearing species. Obviously, these presents map out a course in comparative medicine (human and veterinary) of sufficient scope and importance for the educational system to cultivate.

White Bread a Menace to Mankind

In the attempt to improve the nutritive value of food, the British Research Council has issued a statement on the advantage of bread containing the germ of wheat, in other words, the vitamin E that modern milling removes from the bread we eat. As the JOURNAL has pointed out, modern milling removes ingredients from wheat that probably accounted for the vigor of our forefathers as compared with the lowered vitality of the victims of modern, cake-like bread—our population that made a poor showing in the physical examinations for military service in 1918.

When millers removed wheat germ from bread in the determination (come what may) to prevent rancidity in market flour, they struck a hard blow to human health. The menace is not trivial although it is less apparent in a population like ours that has had the benefits of a mixed diet of vitamins, minerals, and fats.

When wheat made its reputation as the staff of life, bread contained the germ of wheat, the protein granules of the endosperm of the seed, and the finer portion of the bran. With these milled out, bread is not the "staff of life." Were bread to become the major portion of our ration, the fluffy white bread of the present time would have to be replaced as was done by the European countries during the World War. American soldiers abroad in 1918 will recall the delectable but ugly looking bread of the poilu and French civilian, which, along with butter and jam and *café au lait* to furnish the calcium and vitamin B (not then known), kept body and soul together 'til *déjeuner.*

Plants acquire immunity to disease in much the same manner as animals.—*Science News Letter.*

The Rôle of Nutrition in Reproduction*

T. S. SUTTON, B.Sc., M.Sc., Ph.D.
Columbus, Ohio

THAT DIETARY factors play a general rôle in the process of reproduction is a generally accepted fact. It is well known that animals subjected to a low plane of nutrition exhibit impaired or poor reproductive performance. It must be appreciated that reproductive function is conditioned by a series of distinct but interrelated physiological events in which the body as a whole, as well as the sex organs, is concerned. Furthermore, important though less obvious causes of reproductive failure reside in abnormalities which are not the result of infectious disease.

Undernutrition delays sexual maturity in both sexes. Dairy heifers that are well cared for reach puberty at about the seventh month while range cattle often do not become sexually mature until the 15th month. A low plane of nutrition may result in retrogressive changes in the sex organs after they are fully developed. Evidence has been presented demonstrating that neither body growth nor development of the reproductive organs takes precedence one over the other when the food intake is limited.

The effects of the plane of nutrition on reproductive performance are well illustrated in the "flushing" of ewes. Controlled experiments in several countries have demonstrated that flushing results in a larger lamb crop.

In order that flushing may be successful two conditions must be fulfilled. First, the higher plane of nutrition must result in a significant gain in weight. Second, the level of food intake before flushing must be below that which permits the highest possible lamb crop for that particular breed.

It also should be pointed out that a high plane of nutrition does not shorten the anestrus period in the ewe. Neither does the flushing of ewes already on a high plane of nutrition result in a decreased lamb crop. The latter fact is mentioned in view of the recent proposal of an idea relative to lowered fertility in fat animals.* It seems somewhat of a paradox that a high plane of nutrition leads to sterility when the effects of undernutrition on reproduction are so dramatic.

Grant for the moment that fat animals may be found to have poor reproductive performance. Does this necessarily mean that the reproductive failure is a result of the fatness? It could be that the fatness is a result of the sterility or that the sterility and the fatness have a common cause. The effects of castration on body weight and fat distribution are well known. Obesity and sterility in the human result from a lesion of the base of the brain which involves the pituitary gland. A comparable condition can be produced in the experimental animal. It might be well in some instances to consider fatness and sterility as arising from a common cause.

Most of the nutritional deficiencies encountered under practical conditions are multiple deficiencies resulting from an inadequate supply of several rather than single nutrients. This has complicated the problem of accurate diagnosis and effective treatment. In numerous instances a deficiency of a single nutrient has been considered to be the direct cause of sterility, when on later investigation it was found that other nutrients were being supplied in sub-optimum amounts and contributing to the results. As a matter of fact, a deficiency of any nutrient in a ration may result in a multiple deficiency. For example, let us consider phosphorus. Plants grown on phosphorus-poor soils are not only low in phosphorus but low in protein as well.

*From the Department of Animal Husbandry, The Ohio State University; presented at the Ohio State University veterinary conference, Columbus, Ohio, June 12-14, 1940.

*See Food and Life, USDA Yearbook (1939), p. 484.

The immediate effect of a phosphorus-deficient ration is lowered food consumption. When the intake of food is lowered because of phosphorus deficiency it may well follow that a protein deficiency will soon be a complicating factor. Other examples of a comparable nature may be cited from our knowledge of the effects of vitamin deficiencies.

SPECIFIC NUTRIENT REQUIREMENTS

While it must be kept in mind that nutritional deficiencies as found under practical conditions are most frequently complexes rather than deficiencies of single nutrients, for convenience in discussion let us consider the specific requirements separately. All animals have specific requirements for energy, protein, fat, minerals and vitamins. Of the 13 mineral elements known to be necessary in the food of animals, we will consider only calcium, phosphorus, iron and iodine; and of the vitamins only the fat-solubles with a brief mention of some of the recent findings regarding vitamin C.

Energy.—While the effects of general undernutrition are undoubtedly the result of more than one nutrient deficiency, it is evident that the energy supply is an important factor. Experiments have demonstrated that a deficiency in energy alone results in a delay in sexual maturity and an irregularity or cessation of the estrual cycle.

The energy requirements for reproduction consist of the energy stored in the new tissues formed plus the energy expended in the process. The energy stored in new tissues includes that in the fetus and fetal membranes, the enlargement of the uterus and the mammary glands.

The energy content of these tissues was used as a basis for estimating the energy requirement for reproduction. As complete data as we have were obtained from studies with swine in which the daily increase in energy and other nutrients in the products of conception was computed. From these data it has been calculated that a sow producing a litter of eight pigs requires only a 6 per cent increase in energy intake above maintenance over the entire gestation period. It is probable that some errors are involved in these computations, yet it is evident that reproduction does not involve a large increase in energy intake over the maintenance requirement.

Protein.—Experiments with laboratory animals demonstrated that when the total protein intake is inadequate the estrual cycles become irregular or may cease altogether. More recent experiments indicate that this is brought about by a decreased output of gonad-stimulating hormone by the pituitary. The administration of gonad-stimulating hormone to animals in which estrus has been suppressed by a protein deficiency evoked an ovarian response equivalent to that obtained by similar hormone treatment of normal immature females. This is an example of a dietary deficiency exerting an indirect effect on reproductive function. From experiments with domestic animals it appears that our domestic animals are not quite as sensitive to low-protein diets as is the rat.

It should be kept in mind that the quality of protein is as important as the amount. The animal requirement is for definite quantities of the essential amino acids rather than for a quantity of protein.

The dry matter of the products of conception consists largely of protein; therefore, it is evident that there is a substantial requirement for this nutrient during gestation.

Referring again to the data obtained in experiments with pregnant sows, we find that the pregnant sow requires an average increase in protein above maintenance of 32 per cent throughout gestation. Similar data for the cow based on less comprehensive studies indicate that the average daily demand for gestation is 17 per cent above maintenance. These studies show that pregnancy increases the need for protein much more than for energy.

Fat.—A fat requirement or, more specifically, a fatty acid requirement for reproduction has been found in the white rat. Inasmuch as the rations usually fed our farm animals consist largely of natural foods which are never free of fat or of

the specific fatty acids required, it is probable that if any such need exists it is always taken care of.

The existing evidence showing that various lipids play specific rôles in reproduction suggests the desirability of further investigation of lipid metabolism in reproduction.

Calcium and Phosphorus.—The minerals most prominently mentioned in connection with failures in reproduction are calcium and phosphorus. It is easy to find in the literature numerous accounts of sterility directly attributed to a deficiency of these elements, particularly phosphorus. A careful analysis of the data, however, provides evidence that a multiple deficiency probably existed rather than a deficiency of the single element, phosphorus.

Phosphorus deficiency in live stock is largely an area problem. There are areas in which this element is so low in the soil that plants grown thereon do not contain enough of the mineral to adequately supply the needs of live stock. In the United States such areas are known to exist in parts of Michigan and Minnesota. Another phosphorus-deficient area which has attracted widespread attention is in South Africa. It is quite probable that further investigation will extend these areas and locate new ones. It also is probable that areas once well supplied with this element may be depleted by a soil-mining agriculture to the point where the crops grown will no longer supply sufficient phosphorus for optimum animal nutrition.

Reproductive failures due to phosphorus deficiency have been noted chiefly in range cattle. In the phosphorus-deficient areas of South Africa, where an extensive experiment was conducted involving 200 animals over a two-year period, cattle grazing without phosphorus supplement produced a 51 per cent calf crop. In contrast, a comparable group receiving a phosphorus supplement produced an 80 per cent calf crop. Similar results have been presented from various areas in the United States.

It is becoming evident, however, that the deficiency involves other factors. As a result of a study undertaken in Minnesota the conclusion was reached that the reproductive troubles experienced in the phosphorus-deficient areas could not be attributed to a lack of phosphorus alone. Other dietary factors which are now believed to contribute to the troubles are vitamin A and protein deficiencies. In fact, the multiple deficiency may be complicated by partial starvation; the food intake is usually far below normal and the animals are obviously in poor condition.

Roughage-consuming animals are more likely to suffer from a phosphorus deficiency than a calcium deficiency. Animals which consume little roughage—for example, swine—are more likely to suffer from a lack of calcium. A deficiency of calcium has been found to cause intra-uterine death in pigs. It appears that this is a result of a lack in uterine muscle tone.

Milk is abundantly supplied with calcium and phosphorus. It is apparent, therefore, that the lactation period which follows a normal pregnancy may constitute a serious drain on the body stores. The disastrous results of such a drain have been noted in lactating sows and cows.

The proposal of definite quantitative requirements for calcium and phosphorus is difficult because of the complexity of factors contributing to the metabolism of these elements. The efficiency of utilization depends in part upon the calcium-phosphorus ratio. In the animals studied a calcium-phosphorus ratio of 1 to 2:1 has been found to be optimum. The activity of the parathyroid gland must be considered as a factor in regulating the utilization of these elements. A third factor which has recently complicated the problem is the nature of the diet or the presence of other substances in the diet. It has been shown that lactose in the diet favors the absorption of calcium from the digestive tract. In contrast the presence of certain compounds, such as oxalic acid, in a food may interfere with calcium absorption and assimilation. Spinach, because of its high oxalic acid content, is a liability rather than an asset in calcium nutrition.

A fourth factor is vitamin D. For example, with plenty of vitamin D present

the calcium-phosphorus ratio becomes of less importance.

It has been known for some time that dairy cows on rations low in calcium become more efficient in the utilization of this element.

Despite the obvious difficulties in establishing quantitative requirements for these elements, sufficient careful research has been done to provide standards that appear to be satisfactory. The following figures from Michigan for the lactating cow have received widespread attention.

For maintenance 10 Gm. (154 gr.) of phosphorus is required per 1,000 lb. of live weight; to this .75 Gm. (11.5 gr.) should be added per pound of milk produced. On the same bases, the estimated calcium requirement for maintenance is 8 Gm. (123 gr.), with an additional .95 Gm. (14.6 gr.) per pound of milk produced. The Michigan workers further recommend that the phosphorus intake should not go below 17 Gm. (262 gr.) for the pregnant dry cow because of the needs for gestation. The same should be true for calcium.

Expressed in percentage of the total ration for pregnant ewes, a ration containing .35 per cent each of calcium and phosphorus has been suggested. For the pregnant sow 0.5 per cent calcium in the ration should be adequate with somewhat less phosphorus.

It should be remembered that for all species the demands are greater if pregnancy occurs before growth is completed.

Iron.—A large increase in iron requirement accompanies pregnancy. Despite this fact, there is no evidence that there is a practical problem in the case of farm animals, with two possible exceptions. First, in those areas where the soil is so deficient in this element that serious anemia is common, it is quite likely, although not prominently mentioned, that reproductive failure is a part of the syndrome of symptoms. Second, the common occurrence of anemia in suckling pigs suggests that this problem may deserve further critical study.

Iodine.—The occurrence of goiter in farm animals as a result of a deficiency of iodine in the diet of the mother during gestation has been established. This deficiency is largely confined to geographical areas where the soil is low in this element. Although there are no exact data as to the minimum requirement to insure normal offspring, the use of iodized salt has been found effective for all classes of farm animals in goiter areas. Despite the few isolated reports to the contrary, there is no conclusive evidence that the feeding of additional iodine to breeding animals is helpful except where goiter is occurring. The reports to the contrary need further confirmation particularly since well-controlled and well-conducted experiments failed to show beneficial effects on reproduction.

THE VITAMINS

The present status of the question of the rôle of vitamins in reproduction is somewhat chaotic. The dramatic effects of the vitamin-deficiency diseases have encouraged extensive research. A colossal number of papers have been published. A rational interpretation of much of the literature in terms of practical animal feeding is the despair of the nutritionist. We perhaps got off to a bad start when one of the fat-soluble vitamins was labeled "the anti-sterility vitamin." It is quite probable that any one of the numerous vitamins known to exist may have an anti-sterility effect. Furthermore, recent investigations have produced rather convincing evidence that vitamins other than the so-called anti-sterility vitamin may play a more important rôle in animal reproduction under practical conditions.

The first assessment of the problem should rest on a study of the effects of the vitamin-deficiency diseases known to occur under practical farm conditions. Of these there are two which have been accurately diagnosed—vitamin A and D deficiencies.

Vitamin A.—During the recent drouth years when cattle were forced to exist for periods much longer than normal on dry feeds low in vitamin A (carotene) content, many suffered from acute vitamin A deficiency. There is little reason to doubt that less-marked deficiencies exist under normal conditions, but these chronic deficiencies are frequently difficult to detect.

Previous to the drouth years experiments with both laboratory and farm animals produced evidence that one of the striking effects of a lack of vitamin A is abnormal reproductive performance. In all species thus far studied, the reproductive process has been found to be dependent upon an adequate supply of vitamin A. Early experiments with rats showed that a deficiency of vitamin A causes a rapid degeneration of the germinal epithelium of the testes with a resultant loss of fertility. The earlier workers concluded that this was a passive effect and that when animals were returned to rations containing adequate amounts of this vitamin, regeneration occurred. In our own laboratory we have produced evidence that if the deficiency is extended over a longer period of time, the destruction of the germinal epithelium will be complete and regeneration will not occur when a vitamin A supplement is fed. Neither will these animals respond to treatment with pituitary gonadotropic hormones.

We have also been able to demonstrate the degeneration of the germinal epithelium in young bulls. The degeneration was not complete, however, perhaps because the animals were not kept on the deficient ration long enough for the maximum changes to be produced.

In the vitamin A-deficient female there is first a cessation or irregularity of estrus. This disturbance (in the rat) is accompanied by a cornified vaginal epithelium. The nature and extent of the reproductive anomaly depends upon the extent of the deficiency. This may vary from irregular estrus to complete failure to breed. If fertilization does occur, fetal death with abortion or resorption may result from placental injury. In addition to the severity of the deficiency, the symptoms vary somewhat according to the species.

In cattle the birth of dead or weak calves and frequent retained placenta have been reported. The weak calves usually die shortly after birth if allowed to nurse their dams. Following one gestation failure cows usually fail to come in heat again until given a vitamin A supplement. In sows the effects noted have been a disturbance of the estrual cycle and the farrowing of premature, dead or weak pigs. In sheep the lambs die *in utero* or soon after birth. Significantly animals may suffer these effects on reproduction without showing any of the classical symptoms of vitamin A deficiency. We have produced evidence that the demands for vitamin A for normal reproduction take precedence over the demands for other functions.

Another effect of vitamin A deficiency recently reported that may have an important bearing on reproductive function is that when animals are fed low-vitamin A rations the vitamin C level of the blood declines. The significance of this important discovery will be discussed later.

Some data regarding the quantitative requirements for reproduction have been reported. Although these data are not in absolute agreement, they demonstrate that rations in which low-quality roughages are fed can not possibly supply adequate amounts of this vitamin. Fortunately, animals have considerable capacity for storing this vitamin; otherwise the difficulties experienced would be greatly increased.

Vitamin D.—Although rickets has been reported to occur under practical conditions, there is little evidence to show that a lack of vitamin D presents a problem as far as reproduction is concerned. Rickets is a disease of young animals. However, malformation of the bony structures, because of this deficiency, may result in difficult parturition; such has been demonstrated in the human, and may also occur in other species.

Vitamin E.—The occurrence of reproductive failure with striking regularity among rats fed purified rations led to the discovery of a fat-soluble substance which was promptly labeled "vitamin E—the antisterility vitamin." The prominence given the name has brought about the widespread opinion that when reproductive disorders of nutritional origin appear, they must be a result of insufficient vitamin E. That a deficiency of this vitamin results in characteristic reproductive abnormalities in rats is a well-established fact. The

extension of these studies to farm animals has been fraught with difficulties. We are experiencing a barrage of propaganda based on poorly controlled experiments, misinterpreted results and, in many instances, the deliberate distortion of facts.

One of the primary prerequisites for the study of any disease is the ability to produce the disease at will. A review of the facts shows that sterility as a result of vitamin E deficiency has been experimentally produced in laboratory animals only. It is true that only a few attempts have been made to produce the deficiency in farm animals, the reason for this being the tremendous expense involved. Most of the natural feeds given our live stock are well supplied with this vitamin. Therefore, it is necessary to treat the entire ration in such a way that the vitamin E is destroyed. This is usually done by treating the entire ration with an ether solution of ferric chloride, then allowing it to stand until extensive oxidation has taken place. A pioneering attempt in this field has been undertaken at the Iowa Agricultural Experiment Station. Sufficient feed to supply a herd of goats has been thus treated, each batch being tested on rats to assure its freedom from vitamin E before being offered to the goats. Reporting the progress of the work, the Iowa investigators state:

> Unlike rats, the reproductive behavior of male and female goats apparently was unaffected during a period of four and one half years, although restricted at all times to the same ferric chloride treated ration. Thus our original flock of seven goats was expanded to forty-eight without exhibiting reproductive disorders attributable to avitaminosis E. Similarly, twelve original male and female rabbits kindled 137 fully developed young in two years, however, not without an occasional reproductive disorder, the cause of which we have not yet ascertained.

The Iowa experiments are being extended to sheep, and elsewhere similar experiments are being set up for cattle.

These experiments demonstrate that different species differ markedly in their requirement for vitamin E. It is also obvious that the sound therapeutic use of vitamin E should rest on carefully controlled experiments demonstrating the need. Until such results are available we should be guided by such facts as: 1) Vitamin E is widely distributed in the natural feedstuffs ordinarily supplied to our farm animals. 2) Wheat germ oil is not the only source of this vitamin. Soy bean oil is almost as good a source and practically every vegetable oil contains some. 3) The chemical nature of the vitamin has been determined —it is alpha tocopherol—and methods of concentrating it perfected to the point where relatively pure vitamin E will soon be available in quantities. 4) Vitamin E is quickly destroyed when mixed with feeds. 5) Natural grains and roughages probably supply an abundance of this vitamin. On the other hand, little is known of the changes which may occur in the processing or aging of milled feeds.

Vitamin C.—Until recently avitaminosis C—scurvy—was known to occur only in man, monkeys and guinea pigs. This disease has now been described in dogs. In species other than these it was assumed that no vitamin C problem existed. However, it has lately been found that in certain types of sterility in bulls the vitamin C content of the blood and semen is much below normal. The symptoms exhibited by these animals, in addition to the low vitamin C, are lack of sexual activity and poor sperm concentration in the semen. The sperm have a low order of activity and viability. Treatment over a period of several weeks with subcutaneous injections of ascorbic acid (crystalline vitamin C) at the rate of about 1 Gm. (15.4 gr.) per 1,000 lb. of live weight twice weekly has given dramatic results in most instances. The bulls become sexually active and the sperm concentration, motility and viability markedly improved.

A full explanation of the mechanisms involved can not be given at the present time. However, recent experiments have shown that the vitamin C level of bovine blood falls when the animals are fed a ration low in vitamin A. Experiments designed to provide further information are now in progress.

A Cross Section of Some Swine Problems as Viewed by a Bureau Veterinarian on Hog-Cholera Control*

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HOG CHOLERA is still our most deadly and costly swine disease, but it can be prevented by prophylactic vaccination. With respect to this disease, there are three classes of swine owners: 1) The thousands of owners who annually call their veterinarians for prophylactic vaccination, have little or no loss and will testify that this method is the most reliable insurance against hog cholera. 2) Many others desire to wait to see if they can not "get by" some seasons, hoping there will be no cholera, gambling with their swine profits, and are in a rush for vaccination service on the first sign of disease in their hogs. They are in constant dread of cholera. 3) Still others are prone to believe the picture presented by cholera-infected hogs should always be the same and, in any variation from their accepted picture, they wait too long, in many instances, before calling a veterinarian to diagnose the disease, with disastrous results, even with heavy losses from cholera occurring on adjoining farms.

INFLUENZA

Swine influenza, or "flu," is one of the most dangerous diseases in nonimmune droves. This respiratory infection lowers resistance and, in case several hogs die, cholera should be suspected. Large numbers of unvaccinated, heavy hogs are lost each year following outbreaks of swine influenza, such owners believing second attacks of "flu," or relapses, have occurred. They diagnose the condition themselves and call on their veterinarians for more "flu" medicine, when in fact their hogs have cholera and are subject to devastating losses.

ERYSIPELAS

Cases of swine erysipelas are being observed in increasing numbers. Many acute cases were seen where there were a few quick deaths and, later, a progressive involvement of the drove. Sometimes the disease seems to be self-limiting; that is, a few hogs become affected, but recover, and no more sicken. These recovered cases may develop enlarged joints, become unthrifty, and not respond profitably to feed; they are chronic cases and are probably carriers of infection. If swine erysipelas is suspected, the use of erysipelas serum is of value in determining whether or not this disease is present; however, in nonimmune droves, anti-hog-cholera serum and virus should be used, as this procedure often seems to overcome the condition. Some hogs may not respond to serum and virus, and to these, erysipelas serum can be administered. In some droves erysipelas may recur after the use of either anti-hog-cholera serum and virus or erysipelas serum alone, and these will have to be treated again. One drove was observed that did not respond to both anti-hog-cholera serum and virus and erysipelas serum, 19 of 21 treated shoats dying, the other two so badly crippled the owner stated he wished they were dead too. The diagnosis of erysipelas was confirmed by laboratory diagnosis of kidney specimens from two shoats that were killed for postmortem examination during the progress of the disease.

In the case of hogs that are not immune to cholera, the serum and virus treatment is recommended for the entire drove. Just as a warning, numerous cases of erysipeloid in man have been reported recently in eastern Iowa. Do not subject yourself to this infection by performing postmortem examinations with bare hands. Use rubber

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gloves. They are inconvenient at times, but they give protection.

NECROTIC ENTERITIS

Necrotic enteritis is prevalent in all sections and, according to authorities, is second only to hog cholera in death and monetary loss. In prophylactic vaccination for hog cholera, when the infection of necrotic enteritis is latent, the post-vaccination losses are severe. Necrotic enteritis has been treated fairly successfully in many cases by controlled sanitation and the use of alkaline and other preparations in the diet. Recent experiments have shown that diet plays a highly important part in producing and overcoming this condition. While many experiments have been conducted on this theory, for the sake of brevity I shall refer to only one—Technical Bulletin No. 170, "The Relation of Nutrition to the Development of Necrotic Enteritis in Swine," by Davis, Freeman and Madsen of the Agricultural Experiment Station, Michigan State College, East Lansing, Mich., and quote their summary of experiments conducted:

1) Data are presented covering six experiments conducted in three successive years which indicate that necrotic enteritis of swine develops primarily as a result of nutritional deficiency.

2) More pigs were affected with the disease when fed a basal grain ration of yellow corn than when on a barley ration. Intermediate numbers were affected when fed wheat or oat groats.

3) Liver, yeast and particularly nicotinic acid have been fed with remarkable results both as a cure and as a preventive of necrotic enteritis.

4) Rations supplemented with nicotinic acid have prevented the development of necrotic enteritis in the same environment where pigs fed the same rations but not so supplemented have developed the disease.

5) It is suggested that the disease, infectious necrotic enteritis, is a secondary complication caused by intestinal invasion of the organism *S. cholera suis* and probably other organisms after the symptoms of a deficiency of nicotinic acid have developed in the pig.

The foregoing are specific diseases and their diagnoses are beset with many difficulties. With a cautious approach and, occasionally, laboratory assistance, correct diagnoses usually can be made. Uncomplicated cases ordinarily can be handled quite satisfactorily unless owners have delayed too long. The complicated cases call for mutual understanding and close coöperation on the part of the owner and the practitioner.

HEMORRHAGIC DYSENTERY

In some sections it is said that hemorrhagic dysentery (black scours, bloody scours, bloody dysentery) is causing more losses in feeding hogs than all other diseases combined; however, it has not been observed that this condition is prevalent in eastern Iowa. It seems to be more prevalent in hogs obtained from the larger markets, though it is sometimes found in strictly home-raised droves, involving all ages and sizes, and the losses are usually very heavy. In many cases veterinarians report success with alkaline solutions. In those cases observed in eastern Iowa, chlorinated solutions seemed to give good results. In western Iowa Koen reports favorable results with salt in solution with buttermilk and other preparations.

DEFICIENT RATIONS—UNSANITARY SURROUNDINGS—PARASITISMS

Most of us are convinced that deficient rations, the unsanitary surroundings with which many swine are confronted and parasitisms are causing entirely too many of our troubles. What we can not always determine to our satisfaction is which is mainly responsible and which is contributing more fuel to the fire to keep it going. There are times when all three are present, glaringly so, and we wonder how any sane owner will permit such conditions to prevail even after they are pointed out to him.

A vast number of swine raisers expect to overcome these troubles with a little medication in the slop, and it is here that the itinerant peddler, bubbling with enthusiasm over the claimed merits of his nostrums, finds a willing ear, sells the swine raiser a supply of his product for cash, and goes on his way rejoicing because of his handsome profit. Not so the veterinarian, for he knows that these conditions can not be handled with medication alone; that anything he suggests is going to involve the

use of much energy by the owner to curtail infection intake, individual dosing for parasitisms, and the probable outlay of cash to improve the ration. The veterinarian's course is often an indictment of the owner's carelessness. It is not quite as pretty a picture as the itinerant draws, and much more bothersome to the owner. If the itinerant's product happens to be sold on a farm where no medication is needed, he has an enthusiastic booster for his product in the future. While some of these products may have merit, most of them are sold for specific conditions of which the peddler is woefully lacking in knowledge, and for which his product is worthless and nonspecific. Just one illustration. I happened to be staying at a small hotel where one of these itinerants was registered. According to him, his product was a concoction of sulfuric acid and cinchona, would control "necro," parasitisms, or whatever was wrong, and, although they were not allowed to advertise it, "no cholera appeared on farms where this product was fed." He had a bottle of ascarids with the body walls ruptured, allowing the intestines to protrude, and he was telling the swine owners that these intestines were the small worms clinging to the mother worm. He was much surprised when shown the life history of the ascaris to find that it lays eggs. This itinerant's product sold for $5 per gallon, or $22.50 for five gallons—and he was selling lots of it.

It is a mystery how pigs can thrive under such unsanitary conditions as we find on numerous farms where hogs are raised on the same old lots year after year, yet they often do. Twenty years of use for a hog lot is common. The extreme age found in hog lots was one 80 years in use, and up to the time of the investigation, they had had no trouble other than an occasional outbreak of hog cholera, according to the owner. Most of us could not exist under like conditions, yet human beings force animals by confinement to undergo such surroundings.

How much damage is done by parasites? Allow me to quote Benjamin Schwartz, chief of the Zoölogical Division, Bureau of Animal Industry, from Farmers' Bulletin No. 1787, entitled "Internal Parasites of Swine":

> Swine are seriously affected by internal parasites of various kinds, the parasitic infestations of these food animals being second in importance only to hog cholera. Even comparatively light infestations with various parasites may reduce pigs to a state in which they are neither well nor definitely sick; in other words, the pigs become unthrifty. The conditions under which pigs are commonly kept in many parts of the United States are highly favorable to the spread of parasitism and its associated evils of unthriftiness, stunting, weakness, emaciation, and a strikingly high mortality of young pigs. A large, if not a major, part of the mortality of young pigs is due to parasitic infestations acquired early in life, perhaps during the first few days.

The McLean county system of sanitation has proved its value in controlling infestations with roundworms and other internal parasites and, in addition, has probably helped materially in controlling certain bacterial infections that usually occur along with parasitisms in hogs kept in old hog lots. Swine owners who follow this system acknowledge the benefits, but where the practicing veterinarian finds these combined troubles, he usually has a hard time trying to convince the owner that prevention is the only sound method of controlling such conditions. Too often the owners say, "I can't," or "I intended to do it this year, but other things took up my time and I just couldn't do it," or, "The landlord won't allow it," and still they expect the veterinarian to save their pigs with medication.

Many times we have been called to farms where some of the small pigs are dying; others have rough hair and scaly skin and appear slab-sided and emaciated; and some have diarrhea, not dying fast, just dropping off occasionally. Most of the time all are eating some. Temperatures range from subnormal to 106° F. On postmortem examination, we find the lymphatics edematous, sometimes with hemorrhages, usually edema and red hepatization in the apical lobes of the lungs, sometimes a few lungworms in the posterior tips of the lungs, various degrees of ascarid infestation of the small intestines, and rather often, occlusion of

the bile ducts with ascarids, numerous whipworms in the larger bowels, an enteritis varying from a slight inflammatory blush to an acute state, and too often, necrotic enteritis. Sometimes the lungs are fairly peppered with hemorrhages, also the kidneys, and some in the bladder. Parasitism! Barnyard infection! Septicemia! Hog cholera! What have we here? History and death rate do not indicate hog cholera, but it may be there. We may have all three of the others. The premises indicate it. The diet, *i.e.*, feed and water, may be good or it may be poor, and it is poor in most cases.

What to do? It is sometimes surprising what the removal to clean ground will do. Of course, it will not overcome the parasitisms already present, which should be corrected as far as possible with vermifuges before the hogs are moved to clean ground. It does seem that eliminating the intake of infection, providing adequate diet, employing intestinal astringents, and often using mixed infection bacterins (the value of bacterins will be disputed by some) will support what natural resistance the pigs have left to overcome the infections and deficiencies, and should produce good results. In other cases, these measures do not achieve the desired results. Hog cholera is suspected, and should it develop, about all we can do is extend sympathy, for if the pigs do not die from cholera, a lot of them will from the reaction to vaccination, due to conditions present in the pigs. It is my observation that heavily parasitized pigs often succumb to post-vaccination reactions more readily than those lightly infested, and that the reaction is more severe. Almost invariably parasites are found on autopsy in pigs suffering from post-vaccination reactions.

ARTHRITIS

In the case of arthritis and bony enlargements, we see an ever-increasing number of such cases. In small pigs, is this the result of umbilical infection, deficient diet, rheumatism, erysipelas, or bacterial infections of another sort? Some appear thrifty while others do not. It may be any of the conditions mentioned. Proper sanitation will tend to prevent these conditions and it will help to prevent the infections also by avoiding exposures.

At the clinic of the Eastern Iowa Veterinary Medical Association, held in Waterloo, Iowa, during the month of June 1940, most of the cases presented for diagnosis were found on postmortem examination to be the so-called barnyard infection. One very heavily infested case of lungworms was presented, the worms being found in all sections of the lungs. One case of lye poisoning was presented, the mucous membrane of the small intestine being sloughed off.

As suggested by the title, this paper is merely an evaluation of the swine-disease complex as I have found it in this district, and does not include many problems that could be considered.

Acorns and Horse Chestnuts as Animal Feed

In order to conserve for human use food ordinarily fed to live stock, England is feeding acorns and horse chestnuts to domestic animals. Although objectionable at first on account of bitterness, animals soon relish them, reports say. Only pigs persistently refuse to eat them. In this country where hogs are left without the usual concentrates, they eat acorns ravenously.

Parathyroid Solution in Phosphorus Metabolism

Contrary to the general impression, solution of parathyroid affects phosphorus metabolism primarily, and only secondarily controls the level of blood calcium. Parathyroid solution controls the phosphorus level of the blood through increasing the excretion of phosphates by the kidneys and by bringing calcium ions into the blood from the bones. In the treatment of arthritis, the theory suggests the reduction of the phosphorus intake by means of phosphorus-combining chemicals, of which aluminum acetate is an example.*

*A. J. Helfet. New conception of parathyroid function and its clinical application. British Journal of Surgery, xxvii (April 1940), p. 651.

Avian Staphylococcosis*

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THIS STUDY has been stimulated by the observation of several outbreaks of epiornithic staphylococcic arthritis in chickens which, although reported in Europe, seem to be unusual in this country. In one outbreak the disease was followed by sporadic cases of vesicular dermatitis as described by Hoffman,[1] which indicated a causal connection between the two conditions. Staphylococci recovered from these outbreaks and natural fowl pox cases were found to show marked pathogenic properties, as compared with staphylococci from other avian sources.

HISTORY OF OUTBREAK

The main outbreak occurred on a large modern poultry farm which is situated in tidewater lowland. The farm is composed of about 3000 New Hampshire Red and Barred Rock breeders and is engaged primarily in the production of pullorum-free hatching eggs. For purposes of disease control, the principles of quarantine and selective breeding from old stock are relied upon, rather than sanitation, and, on the whole, with excellent results.

In June 1939 the owner reported that within one week 10 per cent of a flock of 170 5-month-old Barred Rock cockerels had come down with a paretic condition which was accompanied by puffy hock joints, anorexia, and some mortality. Over a period of several months 15 specimens were submitted for laboratory study. When the disease was first noted the cockerels were kept in two adjacent range lots which were equipped with wire-floored summer shelters and stocked with 60 and 110 birds, respectively. Feeding, housing and management conditions were the same in both lots, except that the birds in the larger lot had been fitted about one week before the commencement of the outbreak with so-called "specs" or pickguards inserted through the nostrils.

The total mortality in the small lot amounted to two birds, in contrast to the large lot in which 60 birds succumbed to the disease. The high mortality in the "spec"-equipped lot suggested that the wounds produced in putting on the anti-pick device served as a portal of entry for the infection. Sporadic cases were observed in the flock for about ten months.

In December 1939, some roosters of the same flock developed a comb dermatitis which on subsequent tests was also shown to be caused by staphylococci.

Treatment of affected birds with autogenous bacterin or sulfanilamide proved ineffective.

PATHOLOGY

Antemortem examination of specimens failed to show any elevation of the body temperature. Most birds showed some disturbance in locomotion, which was characterized by apparently painful gait rather than flaccid paresis of limbs, as seen in neurolymphomatosis. The outstanding pathology consisted of unilateral or bilateral swelling of the tarsometatarsal joints, which often extended to the middle portions of the tibia and metatarsus, respectively (fig. 1). The inflammatory character of the swelling was evidenced by heat, pain and fluctuation. Firm abscess-like nodes were sometimes encountered in the medial tibia region. In diseased birds kept under observation for several weeks definite changes took place in the outward appearance of the affected hock joints. The lesions tended to become firmer and more localized; not infrequently the superficial veins became prominent and tortuous, suggestive of thrombosis (fig. 2). The lesions varied in appearance according to their age. Acute cases exhibited primarily a serous synovitis

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[1]Hoffman, H. A.: Vesicular dermatitis in chickens. J.A.V.M.A. xcv (1939), pp. 329-332.

and arthritis, while in subacute cases the exudate had a purulent to caseous character, often of a deep orange color. In many instances the articular cartilage over the fossae and condyli showed marked erosions baring the underlying osseous tissue. The tarsometatarsal joints seemed to be the principal points of attack, but the femorotibial and metatarsophalangeal joints

Fig. 1. Avian staphylococcosis, acute stage. Swelling of left hock joint.

were occasionally affected. The muscles in the affected limbs often showed secondary atrophy. In cases of long standing, lesions seemed to persist in the toe joints, finally terminating in a periarticular fibrosis.

Systemic effects of the disease were suggested by a poor state of nourishment, as shown not only by a depletion of the normal fat depots, but also by unusual smallness and flabbiness of the proventriculus and the male gonads. As a rule specific lesions were not observed; in one bird a necrotic focus was noted in the liver and in another a small purulent area in the infraorbital sinus.

The histologic changes were likewise of an indefinite character more or less common to chronic debilitating diseases of birds. The skeletal muscles of the affected legs showed some fibers here and there to be in a state of granular degeneration, while the pancreas and liver exhibited an increase of the interlobular connective tissue. In the liver it was not uncommon to observe periportal infiltrations, chiefly polynuclear and histiocytic in character, such as are found in many other diseased conditions. The kidneys showed occasionally evidence of a chronic glomerulitis, the parietal epithelium having undergone hyperplastic and metaplastic changes leading to adhesions of the glomerular tufts. Whether or not these renal lesions can be considered an integral part of the pathology of avian staphylococcosis remains to be determined.

The cases of staphylococcic dermatitis which came to the authors' attention had progressed beyond the vesicular stage and were of a crustaceous character. In distinction from fowl pox, the affected comb tissue appeared definitely thickened; the localized lesions tended to occupy primarily the posterior regions of the comb and to consist of blackish flat crustaceous alterations which, on removal, revealed either a smooth young epidermal structure or a moist granulation tissue. Histologically the epidermis failed to show the characteristic balloon-like epidermal hyperplasia of fowl pox, but the dermal tissues revealed extensive infiltrative cellulitis. The diagnosis of staphylococcic dermatitis was based upon the characteristic gross and histological lesions, the association of the cutaneous manifestations with old articular lesions in the same bird, and finally upon the isolation of pathogenic staphylococci from the thickened comb structures.

SOURCES OF OTHER STRAINS

Since it was one of the objectives of this study to inquire into the comparative pathogenicity of staphylococci from various avian sources, a number of strains were studied as they became available in the course of routine diagnostic work. A résumé of the case histories follows:

A case of staphylococcic arthritis similar to the one described by Jungherr,[2] in 3 to 6-week-old turkeys furnished another of the pathogenic strains. In this outbreak the attack rate was 6 out of 240 birds. In some of the specimens somewhat unusual findings were purulent foci in the bursa over the keel bone and around the abdominal surface of the acetabulum.

[2]Jungherr, E.: Staphylococcal arthritis in turkeys. J.A.V.M.A. lxxxii (1933), pp. 243-249.

Another case of staphylococcic arthritis which occurred in 4-month-old chickens and which was of about two-week duration resulted in the loss of 25 birds out of 1,500. The organisms involved fell into the pathogenic group.

A case of so-called "battery blisters" was shown to be caused by pathogenic staphylococci. The condition is prone to start with a fluctuating serous bursitis over the keel bone, possibly of traumatic origin; but some of the cases develop arthritic lesions, as did this one.

Fowl pox-like lesions which were later recognized as staphylococcic dermatitis were observed in a lot of battery birds; they proved to be transmissible and yielded a pathogenic staphylococcus.

From two natural cases of fowl pox pathogenic staphylococci were recovered, while tests made on material from five other natural and five induced cases of fowl pox, as well as a stock fowl pox vaccine, failed to reveal the presence of pathogenic staphylococci.

In navel-ill and other more or less indefinite conditions of young chicks one is especially apt to recover staphylococci of questionable etiologic significance. An attempt was made to separate such staphylococcus strains into presumably "septicemic" and "sporadic" strains on the basis of the pathologic findings. The former were associated with a) significant mortality, b) definite evidence of omphalitis, c) fairly uniform isolation of staphylococci from several birds in the specimen lot, and d) good primary growth from several organs. The "sporadic" strains were recovered from miscellaneous specimens of young chicks affected with ulcerated gizzard, coccidiosis, etc., and usually failed in one or more of the criteria used for "septicemic" strains. Neither the septicemic nor the sporadic strains fell into the definitely pathogenic class on the basis of the tests used.

CHARACTERISTICS OF STAPHYLOCOCCI OF AVIAN ORIGIN

Since modern methods for the study of staphylococci have not been applied previously to avian organisms, the biochemic and pathogenic properties of 39 strains derived from diverse pathologic material of avian origin were determined. For a review of the literature on the properties of staphylococci and methods of differentiating pathogenic and nonpathogenic strains, the reader is referred to a bulletin.[3] The sources of the cultures and the results obtained are summarized in tables I and II.

Pathogenic Group.—Of the 12 strains in this group the majority were derived from

Fig. 2. Avian staphylococcosis, subacute stage. Abscess formation and thrombosis of vein.

cases of staphylococcic arthritis, dermatitis and subcutaneous abscesses which occurred in six different flocks. Two strains were isolated from natural fowl pox lesions. All of these cultures appeared to represent a rather homologous group. In general, they were characterized by ability to ferment lactose and mannitol, to peptonize litmus milk, to liquefy both ordinary gelatin and Stone's gelatin-extract medium, to hemolyze erythrocytes of ox and rabbit, but not of chickens and guinea pig, and to coagulate rabbit blood plasma. The hemolysin appeared to be primarily of the alpha type, as shown by hemolysis of rabbit blood and by the production of necrosis in the skin of rabbits. The two pathogenic fowl pox cul-

[3]Plastridge, W. N., Anderson, E. O., Williams, L. F., and Weirether, F. J.: Infectious bovine mastitis-VII. Characteristics of udder staphylococci. Storrs (Connecticut) Agr. Exp. Sta. Bull. 231 (1939).

TABLE I—Principal cultural characteristics of avian staphylococci.

Lesions*	Total No. Strains	Results	Pigment	Fermentation		Litmus Milk**				Gelatin Liquefaction		Ox Blood Hemolysis		Coagulase	Probable Pathogenicity
				Lactose	Mannitol	O or Alk	A	Ac	Pep	Ordinary	Stone's	Agar	Broth		
Joint (7), Skin (3), Fowl pox natural (2)	12	+	10	12	12			2	10	12	12	6	11	12	+
		—	2	0	0					0	0	6	1	0	
Joint (3), Skin (1) Head sinuses (2), Fowl pox natural (5) Induced (5) and Vaccine (1)	17	+	14	13	8	5	2	10		9	7	0	1	0	Slight
		—	3	4	9					8	10	17	16	17	
Navel-ill															
Septicemic (4)	10	+	1	1	0		1	3		4	1	0	0	0	—
		—	3	3	4					0	3	4	4	4	
Sporadic (6)		+	3	0	0	5	1			2	0	0	0	0	—
		—	3	6	6					4	6	6	6	6	

( )* Number in brackets = number of strains.
** Reactions in litmus milk: O or alk = no change or alkaline; A = acid; Ac = acid and coagulation; Pep = peptonization.

tures differed from the others by producing acid and coagulation in litmus milk.

The cultures described differed from staphylococci which are regarded as pathogenic for man by usually causing peptonization of milk, slow instead of rapid acid production in lactose and mannitol broth, and by growing on alkaline bromthymol blue lactose agar* without changing the color of the medium.

Through the courtesy of Miss Ester Meyer, Department of Bacteriology, University of Illinois, a representative culture of the pathogenic group was examined for enterotoxin production and was found positive to the so-called Dolman kitten test.

Pathogenicity tests on six-week-old cockerels showed that broth cultures produced a fatal septicemia or occasionally an arthritic lesion, when administered intravenously, and a pronounced firm swelling 10 to 15 mm. in diameter, when injected intradermally into the wattle. Cultures injected intradermally into rabbits produced lesions which were from 15 to 20 mm. in diameter and characterized by erythema and necrosis.

Nonpathogenic (?) Group.—Among 17 cultures in this group were nine strains which were obtained from the same source as the pathogenic group, and in some instances from the same lesion. The remaining strains were derived from induced fowl pox lesions, a stock vaccine and head sinuses. These cultures appeared to represent an heterologous group, because they gave various combinations of reactions in lactose and mannitol broth, litmus milk and gelatin. All failed to produce distinct hemolysis of ox or rabbit blood, or coagulation of rabbit plasma.

Pathogenicity tests showed them to be apparently harmless to chickens, on intravenous injection. By intradermal wattle tests small lesions up to 5 mm. in diameter were produced. Inoculation into the skin of a rabbit caused an area of erythema of from 5 to 10 mm. in diameter.

Navel-Ill Strains.—These organisms were isolated from chickens under 2 weeks of age, and were the only possibly significant organisms obtained from the particular specimens. As stated before, they were tentatively grouped into "septicemic" and "sporadic" strains on the basis of pathologic findings. The navel-ill cultures also appeared to be heterologous in character. In general they seemed to be less active biochemically than either of the other two groups. However, the "septicemic" strains appeared to attack litmus milk and gelatin more vigorously than the "sporadic"

*This medium was used in the study of avian strains thus far with inconclusive results.

strains. More strains should be studied before these characters can be regarded as significant. Only the intradermal tests in a rabbit showed slight evidence of pathogenicity. (Erythema less than 5 mm. in diameter.)

DISCUSSION

In 1936 a review of the limited literature on avian staphylococci and a description of some properties of several cultures obtained from avian postmortem material were given by Reis, Nobrega and Reis.[4] Since then Hoffman[1] has presented evidence that staphylococci are responsible for a form of "vesicular dermatitis" in chickens. Detailed studies of the organisms were not reported. Association of *Staphylococcus aureus* and *Staphylococcus albus* with natural fowl pox lesions has been reported by Pyle.[5] Dettwiler and Markham[6] found staphylococci in stock fowl pox vaccines and considered them to be nonpathogenic on the basis of subcutaneous tests. Gibbs[7] believed strains of *S. albus* from the respiratory tract of birds affected with laryngotracheitis and colds to be secondary invaders; however, other strains were regarded as the cause of bumble foot, abscesses, infection of the infraorbital sinuses, swollen wattles, pyemia and septicemia.

Recent investigations[3] have shown that ability to produce pigment, ferment lactose and mannitol, attack litmus milk, and liquefy gelatin are inadequate tests for differentiating pathogenic from nonpathogenic staphylococci. More reliable means have become available through the application of the plasma coagulase test and the recognition of two types of hemolysins. This newer information was used in the present studies. The results showed that avian staphylococci which possessed definite pathogenic properties for chickens, as shown by association with certain joint and skin lesions, and by artificial infection of chickens, coagulated rabbit plasma and produced true alpha toxin. In detecting these organisms, experience has shown the necessity of making subcultures from several colonies.

Pathogenic staphylococci may apparently[7] complicate minor operative procedures and natural fowl pox outbreaks. This possibility should also be considered in the preparation of comb grown vaccine. Limited information suggests that these organisms

[4]Reis, J., Nobrega, P., and Reis, A. S.: Doencas das aves. Instituto Biologico, Sao Paulo (1936), pp. 96-101.

[5]Pyle, N. J.: The therapeutic efficiency of avian diphtheria, roup and bird-pox vaccines and bacterins. Massachusetts Agr. Exp. Sta. Tech. Bull. 10 (1926).

[6]Dettwiler, H. A., and Markham, F. S.: A study of the bacteria occurring in commercial fowl-pox vaccine. Poultry Sci., xvii (1938), pp. 46-48.

[7]Gibbs, C. S.: A comparative study of human and avian strains of *Staphylococcus albus*. J. Bact. xxxi (1936), p. 81.

TABLE II—Pathogenicity of representative strains of avian staphylococci.

Source of Strain		Culture Characteristics		Pathogenicity*				
				Birds (Intravenous)	Birds (Intradermal)		Rabbits (Intradermal)	
		Hemolysis	Coagulase		Affected	Degree	Affected	Degree
Arthritis	Chicken	+	+	5/7	3/3	++++	1/1	++++
	Turkey	+	+	1/2	3/3	++++	1/1	++++
Fowl pox, natural		+	+	2/2	3/3	++++	1/1	++++
Dermatitis	Chicken	—	—	0/3	3/3	++	1/1	++
Fowl pox	Natural	—	—	0/3	2/3	++	1/1	++
	Vaccine	—	—	0/3	0/3	—	1/1	+
Navel-ill	Septicemic	—	—	0/3	0/3	—	1/1	+
	Septicemic	—	—	0/3	0/3	—	1/1	+
	Sporadic	—	—	0/3	0/3	—	1/1	+

* Numerator = number of animals affected.
Denominator = number of animals injected.

are capable of producing an enterotoxin similar to that which has been reported as causing staphylococcic food poisoning in man. The use of autogenous bacterins and sulfanilamide in the treatment of avian staphylococcosis seemed to be ineffective.

SUMMARY

An epiornithic outbreak of staphylococcic arthritis was observed in a "spec"-equipped lot of 110 5-month-old cockerels with a mortality of 60, while an adjoining lot of 60 birds without "specs" lost two. The use of the anti-pick device was thought to be a contributing factor in the spread of the disease. Cases of vesicular dermatitis of staphylococcic origin occurred later in the same flock. In view of the etiologic relationship of the two manifestations and the occasional occurrence of a systemic (septicemic) form, the various anatomic designations should be combined under the generic term staphylococcosis.

A comparative study was made of 39 strains of staphylococci isolated from this and similar less extensive outbreaks; also from fowl pox lesions and navel-ill.

A group of strains derived from joint and skin lesions and natural fowl pox lesions was characterized primarily by ability to produce alpha toxin and to coagulate rabbit plasma. Such cultures were lethal to 6-week-old chickens on intravenous injection and caused severe intradermal reaction in chickens and rabbits.

Other cultures obtained from similar sources and from induced fowl pox lesions failed to produce alpha toxin and to coagulate rabbit plasma, but induced mild intradermal reaction in chickens and rabbits.

The navel-ill strains studied were comparatively inactive biochemically, and failed to produce distinct reactions in chickens.

In the determination of pathogenicity and etiologic significance of avian staphylococci, a positive rabbit plasma coagulase test definitely detects pathogenic strains. The wattle test in young chickens permits the recognition of mildly pathogenic strains among coagulase-negative organisms.

What's the Matter with Hog Raising?

The veterinary columnist of *Hoard's Dairyman* (Nov. 25, 1940) speaks wisely about the reasons it is becoming more difficult to raise hogs profitably in the United States. The trouble is parasites, including bacteria, all of which can be controlled where the will to do so exists. But, as the writer points out, while some swine breeders are hard-headed and practical, others are so shiftless that they would sooner quit raising hogs than change their old practices, and too many listen only to their "overwise neighbors or to the glowing stories of a remedy salesman."

Anti-Stomach-Ulcer Vitamin

Workers at the University of Wisconsin (Randle, Sober, Elvehjem and Hart) were able to produce ulcers of the stomach in guinea pigs by depriving them of a newly discovered vitamin contained in milk. In addition to inducing the formation of stomach ulcers the experimental diet caused damage to the liver and kidneys. Whether the same result obtains in man is not yet known. A seasonal variation in the occurrence of stomach ulcers in the experimental animals receiving a milk ration was noted.—*From Science News Letter.*

New-Born Differ in Age

The time of birth is not a criterion as to age measured in terms of fetal maturity. From the extremely premature new-born to the one whose delivery was late, a difference of 20 weeks of age is the range of possibility in the human baby.

Experienced veterinary obstetrists will agree that the range is much the same in domestic animals. The foal that can not stand or suckle or walk without respiratory and cardiac distress is an example of an undeveloped new-born. It is not as "old" as the vigorous foal that is up and doing all right after coming into the world.

Canine Hysteria: Its Relation to Dietary Protein*

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Rochester, Minn.

A RECENT REPORT by Arnold and Elvehjem[1] suggests that certain psychic disturbances of dogs which they term "running fits" are caused by feeding a diet in which the protein has been altered or denatured by heating. It was mentioned that this procedure altered the nutritive value in such a way that there was a deficiency of at least one amino acid. Running fits developed in eight to eighteen days in all the dogs receiving this diet. The authors found that the addition of lysine hydrochloride prevented the occurrence of these symptoms.

The experiments of Arnold and Elvehjem suggest three possibilities as regards the cause of the symptoms noted: 1) that heating the diet produced certain toxic products and the resulting toxemia was manifested by running fits; 2) that the deficiency of protein or an amino acid was the etiologic factor; and 3) that the dogs used in the experiment were affected with some unrecognized disease which made them vulnerable to the effects of certain substances contained in the diet. The latter is strongly suggested by the fact that running fits were noted as early as eight to eighteen days and that four of the five dogs used succumbed in approximately ten, forty, forty-four, and seventy days, respectively, although the supposed deficiency had been corrected.

The possibility of protein deficiency was most interesting, because one of us (G. B.), in connection with another problem, had frequently fed dogs a diet containing as little as 1 per cent protein for ten to twelve weeks, but symptoms of hysteria or running fits had never been observed. This tended to refute the hypothesis that protein deficiency alone was an etiologic factor. Therefore, two experiments were conducted to investigate the effects of feeding.

Four dogs less than one year of age were used in each experiment. In the first experiment the dogs were fed with a heat-treated commercial canned dog food containing 15 per cent of protein. This food was removed from the cans and was heated for five hours in an autoclave at a pressure of 20 pounds. In the second experiment the dogs were fed a diet of our own formula, composed of dried beet pulp, sugar, cooked polished rice, lard, salt mixture and cod liver oil, containing only 1 per cent of protein. This, however, was autoclaved for only two hours at 20 pounds of pressure. A supplement of 10 Gm. of dried brewers' yeast was given to each of two dogs in this experiment three times each week. The former diet was designed to investigate the hypothesis of toxemia due to altered protein as an etiologic factor in the production of running fits, whereas the latter diet was designed to investigate the rôle of protein deficiency with a minimum of toxic products.

The dogs used in these experiments were given as much food as they would eat. Their physical condition and behavior were noted each day and they were weighed once each week.

PROTOCOLS

Experiment 1.—In one dog in this experiment anorexia developed in thirty days. This continued, but was intermittent until the fortieth day. During the following ten days anorexia was complete. Since we were not interested in studying the symptoms and pathologic conditions created by fasting, we terminated the experiment on this dog. He was given a small quantity of untreated canned dog food, which he ate, and his appetite rapidly became normal. In two other dogs in this group anorexia developed on the thirty-fifth day. Their anorexia was intermittent until the fiftieth day, after which they refused to eat, underwent

*From The Mayo Foundation.

[1]Arnold, A., and Elvehjem, C. A.: Is running fits a deficiency disease. J.A.V.M.A., xcv (Sept. 1939), pp. 303-308.

a rapid loss of weight and became listless. On the sixtieth day we administered 900 international units of thiamin chloride intramuscularly to each of these two dogs. On the following day, both dogs appeared active and they ate voraciously the same kind of diet that they had refused persistently during the previous ten days. They continued to eat the autoclaved canned dog food for the ensuing twenty days at which time the experiment was terminated. The fourth dog in this experiment ate the autoclaved diet uninterruptedly for eighty days. It is to be noted that three dogs in this group ingested nothing but the heat-treated commercial dog food for a period of eighty days and the fourth dog secured nothing but this diet for fifty days. If altered protein was present in the diet, it did not cause running fits or other nervous disturbances. It is apparent that vitamin B_1 deficiency probably was a complicating factor, because symptoms of anorexia disappeared following a single administration of thiamin chloride in two dogs. A slight increase in weight was noted in all four of these dogs, but this apparently was due to an increase in stature and not flesh, because the dogs were definitely thin.

Experiment 2A.—The dogs receiving the heat-treated low protein diet alone showed changes in weight similar to those observed in experiment 1. An initial increase in weight due to growth in stature was noted, but they appeared emaciated when the experiment was terminated. The diet was tolerated fairly well, but intermittent anorexia developed in both the dogs on the twenty-ninth day. It was rather persistent in one dog. On the sixtieth day the plasma protein levels were determined and were found to be very low. At this time the low protein diet was discontinued and the dogs were placed on the autoclaved canned dog food diet. Their appetites at first were poor, but after sixty-five days they ate fairly well and continued to do so until eighty days when the experiment was terminated.

Experiment 2B.—The two dogs receiving the heat-treated low protein diet with a supplement of 10 Gm. of dried brewers' yeast three times each week per dog, showed better appetite than the two that received no yeast with this diet. In one of these, however, slight anorexia did develop after twenty-nine days which was intermittent until the seventieth day. On the sixtieth day the plasma protein levels were determined and were found to be low. The dogs were then placed on the autoclaved commercial canned dog food diet with 10 Gm. of dried brewers' yeast three times each week for each dog. The change of diet was not tolerated well during the first few days and that dog in which anorexia was noted previously refused to eat. This animal received an intramuscular injection of 900 international units of thiamin chloride on the sixty-third day, but the dog's normal liveliness and appetite did not return until the seventieth day. At this time the dog ate well and needed no further treatment. This experiment, too, was terminated on the eightieth day.

It is to be noted that the dogs receiving the low protein diet underwent protein depletion for a period of sixty days. The level of the plasma proteins at that time was 3.58 and 5.45 Gm. per 100 cc. for the two dogs of experiment 2A and 4.44 and 3.75 Gm. for the two dogs in experiment 2B. The normal level of plasma protein in dogs has been consistently found to be 6 to 6.5 Gm. per 100 cc. The animals in experiment 2, therefore, were subjected to the effects of protein depletion for sixty days after which, for twenty days, they were given a heat-treated diet containing approximately 15 per cent of protein. Neither of these diets caused symptoms of running fits or other nervous disturbances in the dogs used in our experiments. Therefore, our experiments tend to indicate that neither protein depletion nor the feeding of a diet in which the protein has been altered by heat are primary causative factors in the production of fright disease, running fits or other similar nervous phenomena in dogs.

SUMMARY AND CONCLUSIONS

Four young dogs were fed a diet that was autoclaved for five hours at 20 pounds of pressure to alter the protein present.

It would appear that any of the symptoms observed were due to a deficiency of vitamin B and not to the quality of the proteins present. Symptoms of running fits or other similar nervous phenomena were not observed.

Four young dogs were fed a protein-deficient diet for sixty days. The plasma protein levels were definitely below normal. Running fits or other similar nervous symptoms were not observed. The subsequent feeding of a heat-treated diet containing approximately 15 per cent protein likewise failed to produce running fits or similar symptoms.

The feeding of a diet containing altered or denatured protein, or one containing an inadequate quantity of protein does not appear to be the primary cause of running fits or other similar symptoms in dogs.

Mechanical Diagnoses

Once upon a time, not in the distant past, the only robot the diagnostician used was the clinical thermometer. Some used the stethoscope and pleximeter and some occasionally examined the urine chemically. The microscope, sphygmomanometer, hemometer, x-ray machine, electrocardiograph, centrifuge and incubator were not in the picture of routine clinical work. There were no allergic or serological tests to confirm a diagnosis of glanders, tuberculosis, or bacillary white diarrhea as a common disease of chickens was called. Nerve blocking to aid in locating the site of a lameness came only at the turn of the century. Besides the special senses and the mind to draw conclusions, there was no aid. As mechanics came more and more into use, it led to a too common belief that unerring diagnosis leading to a specific treatment of all ailments was in sight. But that has not happened. The narrow margin between normal and abnormal biological processes still required the special senses and the alert mind to interpret. In fact, while mechanics has become more of a factor in clinical work, mechanical diagnoses can be absurd when unwisely judged.

Mechanics aids but does not replace the fine senses of touch, hearing, smell and sight. Adding mechanical evidence to what these reveal brings the sort of diagnosis that prevents successful intrusions upon the field of clinical medicine, while mechanics alone invites intruders into the field of professional work and encourages quackery. Mastitis, pullorum disease, tuberculosis, brucellosis, etc., are examples of mechanical diagnosis of animal diseases leading to their misuse by laymen, but as pointed out in *The Journal of the American Medical Association*, even scientists of the higher order, not medically trained, can draw erroneous conclusions from them.

The upshot is that absolute dependence upon the laboratory is as faulty as the exclusive use of the special senses now that the laboratory is here to aid them. Doctors must not leave their minds behind; the mind is still useful.

Vitamins Vital, Calcium Insufficient

In order to maintain sufficient nutritive levels in restricted rations, war-torn England is systematically supplementing the people's food with vitamin A, thiamin hydrochloride (vitamin B_1) and calcium. These are added to edible fats, flour and cereals on the recommendation of the Medical Research Council to maintain "at high levels the strength and courage of its people."

Commenting editorially on the situation, *The Journal of the American Medical Association* reminds our country of the narrow margin between the intake of vitamin B and man's physiological requirement of that factor, and (quoting Steibling of the U. S. Department of Agriculture) there is a large proportion of "poor diets in peaceful America with its bursting granaries and troublesome problems of overproduction. These diets are poor in vitamin A, D, B_1 and calcium."

With these facts becoming generally known, definite syndromes for specific and combined avitaminoses and mineral deficiencies are being more and more definitely outlined for the veterinarian and his clientele.

CLINICAL DATA

Wound Healing in Sheep*

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DAMAGE DONE to sheep by stray dogs is still a serious economic problem. The literature contains only a few references to actual cases.

On October 17, 1940, our attention was called to a flock of sheep seriously injured during the night. The flock consisted of 36 Shropshire ewes (1 to 5 years old) and one ram. Upon our arrival at the pasture at about 9:00 a. m., these sheep appeared tired and dejected, suggesting that they had been chased around the enclosure for some time. The dogs, an Irish Setter and a German Shepherd, were seen running the flock at about 7:00 a. m. by an employé, who with difficulty managed to scare the two dogs away.

Closer observation showed that all 37 sheep were wounded. Some were slightly injured, others more extensively. The majority of the injuries were puncture wounds, confined mainly to the front legs, involving the postero-medial aspect of the leg between the scapulo-humeral (shoulder) and cubital (elbow) joints where the wool is scanty. Several ewes were bitten about the antero-medial aspect of the hind legs and about the face. The more extensive lesions included skin lacerations with exposure of the underlying flexor muscles. In several cases tendinous shreds (tendinous inscriptions and intersections) were exposed. Fly ova and larvae were present at the edges of the wounds on several of the more severely injured ewes.

Treatment consisted of w a s h i n g the wounds with a suitable antiseptic solution, cutting away the loose wool and lacerated tissue, and establishing bottom drainage. This was followed by a local application of bipp (bismuth subnitrate, 1 part, iodoform, 2 parts, liquid petrolatum, 7 parts), and in several cases powdered sulfanilamide was applied locally. Later the sulfanilamide application was discontinued because bipp was more effective as a fly repellent. At the conclusion of the initial treatment the prognosis was considered unfavorable for at least six of the ewes.

On the following day the wounds were reopened on several of the sheep to effect better drainage, and bipp again was applied. No new fly larvae were present.

On October 19, all but six ewes were on their feet and eating. Regardless of the extent of their injuries, a day of rest appeared beneficial. These six ewes were unable to arise without difficulty and rested on their elbows. Bottom drainage was reëstablished where necessary to remove air or gas formation under the skin as well as a creamy, purulent exudate which had formed in several of the wounds.

Two days later at about 5:00 a. m., the two dogs returned and bit a Southdown ewe. Their approach was to corner a ewe, grab her by the nearest limb and throw her to the ground. A shotgun barrage sent them scurrying away.

After a two-week period five of the six ewes had recovered with no apparent ill effects. The one remaining ewe showed a contracture of the flexors of both fore legs and hobbled around on her elbows. Medical care was continued every other day for about a month. The right fore leg was apparently normal. The left fore leg had a

*Paper No. 1851, scientific journal series, Minnesota Agricultural Experiment Station; contribution from the Division of Veterinary Medicine.

slight contracture at the matacarpo-phalangeal (fetlock) joint due to disuse and the formation of cicatricial tissue. The prognosis was favorable.

This report is of interest in that sheep in good condition appear resistant to wound infection. Simple medical care and the use of a fly-repelling antiseptic apparently induced rapid recovery. The presence of living larvae indicated that viviparous flies were still active. One disregarding this fact might easily have erred in diagnosis as to the time the wounds were inflicted.

The Chemistry and the Fate of Phenothiazine in the Body

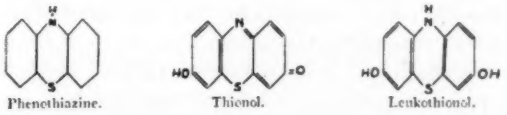
PHENOTHIAZINE is one of the thiazine dyes. It is the parent of methylene blue, thionin (Lauth's violet) and other dyes of the series. It was discovered to have insecticide properties in 1935 by Smith, Munger and Siegler.[1] It was, however, workers in the U. S. Bureau of Animal Industry who discovered its low toxicity in animals (sheep, cattle, horses) and its powerful toxicity for intestinal worms.

It is prepared from diphenylamine and sulfur. Its physical property is that of a fine, yellowish powder, practically insoluble in water, and although called tasteless by chemists, it is somewhat distasteful to animals when given mixed with feed. Phenothiazine owes its fungicide and insecticide properties to undergoing slow oxidization in the presence of moisture and air, and obviously in this property lies its anthelmintic action.

As seen by the formula, phenothiazine is a close relation to sulfanilamide. It is excreted by the urine either unchanged or as thionol or leucothionol, and has demonstrable value as a urinary tract antiseptic. The urine turns red and a bacteriological examination of the red urine shows that it was influenced by a bactericidal action. The excretion product, thionol, is the one having the antiseptic action. The drug has been shown by endoscopic examination to decrease the hyperemia of an irritated bladder. Sufficient acidity of the urine (4.5 to 5.5) improves its antiseptic action on the urinary channels.

No harmful action on the digestive tract, circulation, kidneys or liver has been observed, though large doses in experimental rats sometimes cause a transient hemolytic anemia.

In parenteral parasites, larvae and embryos, the action remains to be demonstrated. Tests[1] on experimental trichinosis in rats were not convincing. The medicinal value of phenothiazine for human use has not been proved to the satisfaction of the Council on Pharmacy and Chemistry of the American Medical Association to be admitted as a nonofficial remedy.



[1]The Journal of the American Medical Association, June 16, 1940, p. 1721.

Phenothiazine in Heaves

Symptoms of shock in a heavy horse comparable with the anaphylaxis following injections of heterologous serum were observed after the administration of 50 Gm. of phenothiazine. The shock lasted several hours and disappeared without treatment.

The subject was a middle-aged riding horse that had been suffering slightly from pulmonary emphysema for several months. On becoming weak under the saddle and showing more than the usual degree of respiratory distress without apparent reason, a microscopic examination of the feces was made. The feces were found to be loaded with strongyle ova. The phenothiazine was given in boluses.

Though large doses in man are said to cause hemolytic anemia, the case is reported without contending that heaves may be a contraindication for this drug.—*T. B. Crowe, Chicago.*

Dried blood comparable to powdered milk is now used as blood banks. It may be the blood bank of the future surgeon.

Carcinoma of the Thyroid: A Report of Five Cases in Dogs

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Buffalo, N. Y.

CARCINOMA of the thyroid is not uncommon in dogs. Klemperer and Moschkowitz[1] and Feldman[2] call attention to a total of about 175 cases reported in this country and Europe. It is generally agreed that endemic goiter predisposes to neoplasms of the thyroid.[3] Metastatic foci are most commonly found in the lungs.[4]

Buffalo is in the Great Lakes' "goiter area." Although specific data is lacking, clinical observations lead us to believe that the goiter incidence is high. In a group of 28 carcinomas in dogs, five were primary in the thyroid.

CASE 1

The subject was a 15-year-old female Boston Terrier, with a history of an enlarged thyroid for at least three years, gradual, progressive emaciation for several months, dyspnea, increased thirst and vomiting for two weeks. Euthanasia was performed.

The thyroid was bilaterally enlarged, 10 x 5 x 2 cm., and lobulated. Transection showed a firm, pink mass containing cysts of various sizes in which there was a thin, reddish fluid. Both lungs contained numerous firm, white foci from 0.5 to 1 cm. in diameter. Several nodules, 1 to 3 cm. in diameter, were located in the liver. One ovary was cystic. The parenchyma of the thyroid tumor consisted of cuboidal and columnar epithelial cells with a tendency toward the formation of follicles; some contained pale-staining colloid and others had no lumen. Many follicles were cystic, and in these epithelial cells "piled up" within the lumen. General disorder prevailed. The mass was encapsulated. The metastatic foci consisted of irregular groups of cuboidal cells with round, deeply stained nuclei. There was a primary cystadenoma of the ovary.

CASE 2

This aged, male, mongrel hound was brought to autopsy without history. There was a bilateral hyperplasia of the thyroid, each lobe measuring about 7 x 4 cm. The mass was smooth, soft and movable, and dissected with ease. The cut surface was deep pink, soft, and oozed blood.

There was a nodular mass, about 5 cm. in diameter, in the anterior mediastinum. The central portion was cavernous and contained a bloody fluid. There were discrete nodules throughout both lungs, 0.5 to 1 cm. in diameter. The surface of the liver was rough. Sections of the enlarged thyroid showed small round and cuboidal cells forming minute follicles with and without lumina. No colloid was present. There was much hemorrhage throughout the tumor, causing it to appear hemangiomatous. The mediastinal tumor and the foci in the lungs were identical with the thyroid neoplasm. The liver was cirrhotic.

Because of the well-organized development of this malignancy of the thyroid, Elton[5] prefers to call it a metastasizing fetal adenoma.

CASE 3

The third case was an 8-year-old female Boston Terrier with a unilateral, irregular enlargement of the thyroid of about six-month duration. There was a history of intermittent periods of vertigo. There was an increased respiratory murmur. One month later, severe dyspnea developed and the dog was destroyed. At autopsy the left lobe of the thyroid was found to be irregu-

[1]Klemperer and Moschkowitz: Carcinoma of the thyroid with metastases to the lungs. J.A.V.M.A., xciii (Oct. 1938), n. s. 46 (4), pp. 220-224.

[2]Feldman, W. H.: Neoplasms of Domesticated Animals. (W. B. Saunders Co., Philadelphia, 1932), p. 304.

[3]Bartlett, Marine and Lahnert, Wegelin, Huguenin: Quoted by Feldman.[2]

[4]Ewald: Quoted by Feldman.[2]

[5]Elton, N. (pathologist, Millard Fillmore Hospital, Buffalo, N. Y.): Personal communication.

larly enlarged, measuring 3 x 3 x 7 cm. The isthmus and right lobe also were involved (fig. 1, C). The mass was closely adherent to the trachea and esophagus. Upon cross section the tumor appeared to be firm, white and glistening. The lungs contained hard, white nodules, 0.5 to 2 cm. in diameter (fig. 1, B). The right kidney was enlarged. A cross section revealed a soft, friable, reddish mass 3 cm. in diameter (fig. 1, A).

Except for a few follicles beneath the capsule, the primary lesion lacked resemblance to the thyroid gland. Sheets of cuboidal cells with distinct, round nuclei were divided into irregular groups by dense, collagenous trabeculae. There was evidence of invasion of the surrounding tissues. The metastatic foci in the lungs showed a tendency toward the formation of follicles, though lumen and colloid were lacking. The sectioned kidney was similar to the lesions in the lungs, except that extensive hemorrhage had occurred.

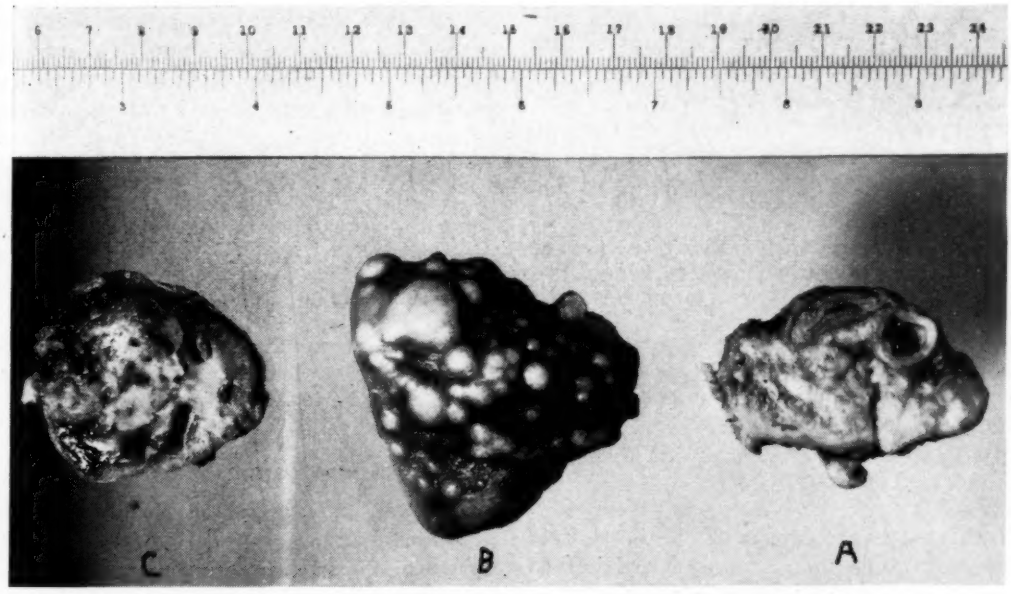

Fig. 1. Carcinoma of the thyroid. A, thyroid; B, lung; C, kidney.

CASE 4

Case 4 was a 12-year-old female Spitz with a history of inappetence, increased thirst, and bronchial cough for four months previous to examination. The animal was emaciated. Her abdomen was swollen and tender. Respirations were shallow and fast; there were no respiratory sounds in the lower third of the chest. The thyroid was unilaterally enlarged and irregular. Euthanasia was performed.

The left thyroid was 3.5 cm. in diameter and 8 cm. long. The cross section was firm and white. The thoracic cavity contained about 500 cc. of straw-colored fluid. There were many white nodules throughout both lungs. The liver was yellowish and friable. The abdomen contained two handsful of recently clotted blood. Both kidneys were enlarged and cystic. The right kidney was 8 x 12 cm.; a rupture of the capsule near its hilus was apparently the source of the intra-abdominal hemorrhage. The left ovary was cystic.

The sectional thyroid showed irregular masses of round and cuboidal epithelial cells separated by septae of collagenous tissue. In some areas tiny acini were present containing colloid. Foci in the lungs and kidney contained ill-defined follicles. Large amounts of extra-follicular colloid were present throughout the metastatic lesions. There was fatty degeneration of the liver. The

ovary contained cysts and corpora lutei infiltrated with granulosa cells.

CASE 5

This 13-year-old male Boston Terrier was presented with a history of inappetence and difficult respirations for one month and "goiter" of long duration. There was a smooth, firm, immovable mass at the site of the thyroid. There was an increased respiratory murmur. The animal was destroyed.

There was a single, regular mass, 6 x 9 cm., at the site of the thyroid, firmly attached to the trachea and esophagus. The cut surface was firm and white. There were many firm, white nodules throughout both lungs averaging .75 cm. in diameter. The liver was yellowish.

There were a few normal follicles containing colloid in the peripheral portion of the sectioned cervical mass. The tumor consisted of a patternless arrangement of round and cuboidal cells with a tendency toward the formation of empty follicles. The formation of cysts, deposits of calcium, and cholesteatomatous areas designated degeneration. The metastatic foci in the lungs showed neatly arranged cuboidal epithelial cells forming minute acini. There was advanced fatty degeneration of the liver.

SUMMARY

In four cases of carcinoma of the thyroid observed clinically, the enlarged gland caused but little mechanical disturbance. The symptoms warranting euthanasia were the result of involvement of the lungs and kidneys, and secondary affection of the liver. Metastasis to the lungs occurred in all five cases. In addition, one metastasized to the liver, two to the kidney, one to the mediastinum. Although cases 2 and 5 may be classed, histologically, as fetal adenomas, they have been placed in this group because of their ability to metastasize. All five cases were in dogs 8 years of age or older. Four were females and one was a male.

Benzol 90 per cent is recommended as the best treatment to use against screwworms. Pine tar applied after the benzol is injected is used to repel the reinfecting flies.—*USDA.*

Firing Is Cruel

Writing to the editor of *The Veterinary Record,** R. C. G. Hancock states: "The firing of horses for lameness is useless and in all senses of the word shocking. . . . I regarded the use of the cautery as cruel and found later it delayed or rendered less effective the repair of the tissue aimed at. I therefore ceased to fire horses and am delighted to find myself in distinguished company."

Preventing Cornstalk Disease

Cornstalk disease, having been found to be of less frequent occurrence in animals turned on machine-picked fields than on fields picked by hand, is said to be prevented by breaking down the stalks of the hand-picked field. Breaking up the stalks appears to prevent the generation of the toxic products that cause the disease. Dragging a heavy iron bar under the wagon in hand picking is recommended by the veterinary columnist of *Successful Farming.*

Corn Belt practitioners need not be reminded that in certain years cornstalk disease kills many cattle and horses.

Alcohol and Vitamin B_1

The well-known fact that eating counteracts the toxic action of alcohol is explained by the action of the thiamin the food intake contains. In the habitual alcoholic who eats but little, energy is maintained by the alcohol. Being vitamin-free, it thus contributes to the nutritional deficiency characteristic of alcoholism. Otherwise stated, alcohol is a vitamin-free source of calories and, since it steps up energy, it is a two-edged sword because it causes an increased demand for vitamins when there is none present. The upshots are the nervous phenomena expressed in vitamin B deficiency: psychoses, neuroses, asthenia and the associated organic disturbances.

While alcoholism is not a problem of veterinary medicine, its mechanism clarifies the pathology of certain clinical and subclinical ailments of animals.

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*The Veterinary Record, Oct. 26, 1940, p. 766.

The "Ubermikroskop"

A BETTER LOOK into the erstwhile invisible realm came into being in the 17th century when Leeuwenhock, Dutch scientist, invented the improved magnification that led to the present microscope of the laboratory, the familiar instrument of medical research, which shows images 2,000 times larger than their actual dimensions. Then

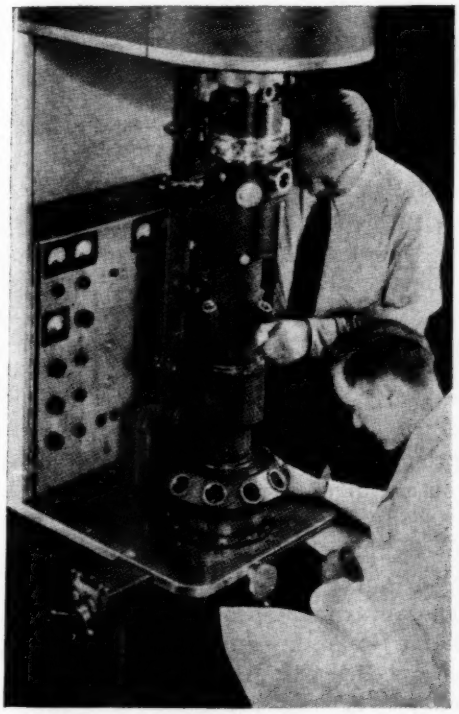

Fig. 1. New RCA electron microscope which magnifies particles from 20 to 50 times as much as the finest optical microscope. V. K. Zworykin (standing) and James Hillier (at the controls) of the RCA Electron Research Laboratory.

came the ultraviolet light microscopy which raised this figure to 5,000 diameters. Now there arrives the electron microscope which attains magnifications up to 30,000, or sufficient to bring the molecules of certain organic substances into the perspective of the human eye. It is claimed that with the aid of photographic enlargements, this magnification can be increased to 100,000 to 200,000 diameters. Matter but one fiftieth the size of anything previously visible may now be examined as to its physical structure. This means, says Watson Davis in *Science News Letter*, that "science is crossing the frontier of a new world."

What this improved microscopy holds out for the industrial laboratories is self-evident. In the biological sciences it is an *avant-propos* comparable with the microscopy of Leeuwenhock which gave birth to the era of medical research in which we now live, the era when magnification went

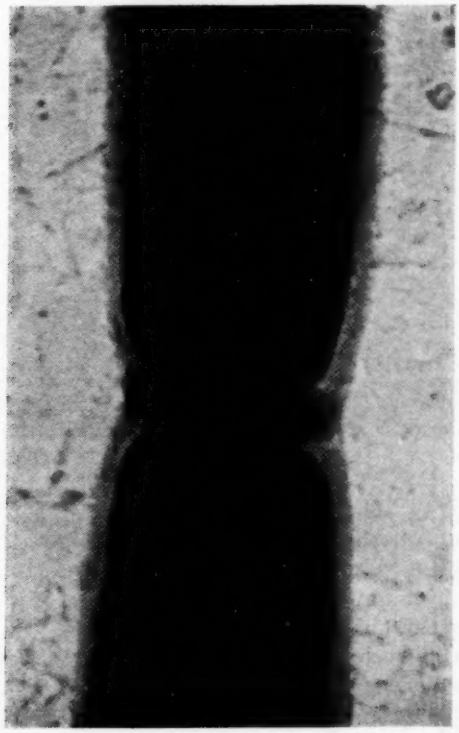

Fig. 2. Bacillus anthracis (x 45,000) as it appears under the new microscope. Portions of the two bacilli are shown with an unknown substance between their ends.

from x 4 to x 200,000 and the intermediate diameters which exposed the nature of many diseases and made the conquest of them a mere routine compared with the random essay of premicroscopic times.

The "ubermikroskop" of the German inventor, Ruska, was a costly instrument, the size of a house. The latest model made in

America (fig. 1) will pass through a door and costs but $9,500. Credit for the invention belongs to no one man. As in nearly all scientific discoveries, it is the work of predecessors that leads to the final goal. Thompson of England, who discovered the electron (about 1900); de Broglie of France, who said that electrons were waves; Busch, who proposed the idea of electron lenses;

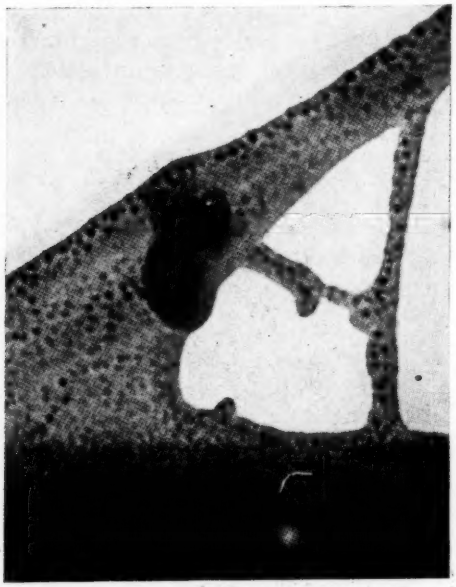

Fig. 3. Probably a molecule (x 105,000) of a synthetic rubber substance manufactured by Goodrich.

and American workers who developed the field of electron optics, represent the chain of events which led to the making of the present "ubermikroskop."

One looks to physics, not medicine, for the meticulous detail of this remarkable achievement. Suffice to say that the visible world has been augmented and that new knowledge in medical science is certainly in the making when the human eye can draw lines between the atoms of a molecule, or measure the Angstrom* with a "yardstick." [*Photos reproduced from Science News Letter.*]

New varieties of hybrid corn are said to resist cornborer infestation better than the common varieties.

*1/10,000,000th of a millimeter.

Promin in Experimental Tuberculosis

Promin is a new drug of the sulfanilamide group, which workers at The Mayo Foundation (Feldman, Hinshaw and Moses) announce as a possible aid in the chemotherapy of tuberculosis. Guinea pigs suffering from experimental tuberculosis live longer if treated with promin. While 20 untreated guinea pigs affected with experimental tuberculosis all died in 82 days, 13 out of 29 promin-treated ones were still living after 164 days. Moreover, the severity of the tuberculous lesions in the treated animals was manifestly less.—*From Science News Letter.*

Hospitals

The early 1890's saw the beginning of better hospitalization for human patients, but not for animals. With the exception of a very few infirmaries for large animals, there was little to classify them as scientific institutions. They were but shelters for the sick and dying. The fine institutions for small animals now scattered over the country did not exist, and the first that sprouted up during the first 20 years of this century were "smelly," unsanitary and unfit for habitation, let alone for treating the sick.

There was nothing in sight to justify the building of such patterns as Johns Hopkins and Bellevue. Dog fancy was an undeveloped branch of domestic animal husbandry. The population of purebred dogs such as existed in England, France and Germany was too small and the few owners of that class of dogs had not acquired the habit of going to the veterinarian. The purebred dog industry and fine animal hospitals developed simultaneously. The one, no doubt, has aided in building up the other.

The Chicago *Times*, briefing a survey made by the National Dairy Products Corp., states that 50,000 cows have been sired through test tubes during the activities of 50 artificial insemination associations in 22 states.

Pentobarbital Sodium as an Anesthetic for Minks*

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A 2 PER CENT solution of pentobarbital sodium was administered subcutaneously to eleven minks, of which six were females and five were males. The weights (in grams) of the individual animals were:

Females	
No. 8F10	720
1	754
7	497
9	703
21	754
23	639
Males	
4	1,390
8	970
10	1,100
14	1,100
16	1,400

Hypnosis was considered to be produced when the animal failed to respond to several light taps on the nose, to which the normal animal responds by biting. Termination of hypnosis was considered to be the time at which the animal again responded to like stimuli. The minimum hypnotic dose is considered to be the smallest dose capable of producing hypnosis in more than half of the animals under the conditions of the experiment.

EXPERIMENTAL PROCEDURE

Sleep was first produced with a dose of 20 mg. per kilogram of body weight. The progress of the anesthesia follows that described for cats[1] after iso-amyl-ethyl-barbituric acid administration. The first symptom is unsteadiness of the hind limbs, appearing in minks with a dose of 22 mg. per kilogram in an average of nine minutes after administration. The ataxia progresses and sleep follows in an average of 38 minutes after administration. Table I gives the results of a series of experiments in which small doses were used on a limited number of animals.

TABLE I—Results of experiments with small doses of pentobarbital sodium.

ANIMAL	DOSE (MG./KG.)	INCOÖRDINATION (MINUTES)	HYPNOSIS (MINUTES)
8F10	10	10	—
16	10	33	—
10	15	19	—
23	16	20	—
21	18	11	—
10	20	16	34
16	20	15	—
1	20	9	41
14	25	9	12

With the minimum hypnotic dose the sleep was light, but the animal could easily be handled without danger of our being bitten. Deep pain sensation was not lost with a dose of 20 mg. per kilogram. During the early stages of hypnosis and after partially recovering from sleep, the animals appeared more docile than normally. No objectionable symptoms were observed with the single exception of vomiting in one animal (No. 21) following the administration of 22 mg. per kilogram. Table II shows the time in minutes of the first signs of incoördination, onset of hypnosis, and recovery from hypnosis in eleven animals after administration of 22 mg. per kilogram of pentobarbital sodium.

All animals exhibited a marked depression of the rate and depth of respiration. Respiration rates of less than one half the rate observed before administration were noted. The heart rate appeared to be but little affected.

DISCUSSION

Werner, Pratt and Tatum[2] showed that hypnosis in rabbits was practically instan-

*Technical paper No. 337 of the Oregon Agricultural Experiment Station; contribution from the Department of Pharmacology and Pharmacognosy, School of Pharmacy, Oregon State College, with the Department of Fish and Game Management, Oregon Agricultural Experiment Station, coöperating.

[1]Mulinos, M. G.: J. Phar. & Exp. Therap., xxxiv (1929), p. 425.

[2]Werner, H. W., Pratt and Tatum: J. Phar. & Exp. Therap., lx (1937), p. 189.

TABLE II—Time (in minutes) of the first signs of incoördination, onset of hypnosis and recovery from hypnosis in eleven animals after administration of pentobarbital sodium, 22 mg. per kilogram of body weight.

ANIMAL	INCOÖRDINATION	HYPNOSIS	RECOVERY
9	5	—	—
10	12	21	58
14	6	13	120
16	11	70	86
21	9	59	80
23	14	—	—
9	9	—	—
1	7	13	120
8	10	—	—
4	9	44	60
7	10	—	—
Avg.	9	38	87

taneous when pentobarbital sodium was administered intravenously. The intravenous avenue of administration would appear to be preferred in this instance, since rapid induction and short duration of anesthesia are to be desired. Minks, however, present several difficulties to intravenous administration, especially since no prominent vein was found suitable for use. The fur covering the area selected for administration could not be removed without damaging the pelt and making it unsuitable for sale. Moreover, the animals were extremely difficult to hold. Consequently, the subcutaneous method of administration was used throughout.

Nicholas and Barron[3] reported that male white rats required twice the female dose of iso-amyl-ethyl-barbituric acid in order to produce anesthesia. Kennedy[4] found no correlation between dose and sex with N-methyl-cyclohexenyl-methylbarbituric acid in white rats. Holck and Kanan[5] later confirmed the findings of Nicholas and Barron, and reported a similar correlation in white rats with pentobarbital, N-methyl-cyclohexenyl-methylbarbituric acid, and butyl-B-bromoallylbarbituric acid. They observed no correlation with N-methyl-cyclohexenyl-methylbarbituric acid in dogs, cats, rabbits, guinea pigs and turtles. The weight of minks varies with the sex, the females averaging about two thirds the weight of the males, thus making any correlation between sex and dose also a correlation between weight and dose. Of the six anesthetized with a dose of 22 mg. per kilogram (table II) four were males and two were females, thus indicating that the dose is independent of the sex in minks.

Werner, Pratt and Tatum[2] recently investigated a group of "ultra-short-acting" barbiturates, including ethyl-(l-methylbutyl)-thiobarbituric acid, N-methyl-cyclohexenyl-methylbarbituric acid, and the thioanalog of iso-amyl-ethyl-barbituric acid, which offer possibilities for further study in this field.

SUMMARY

Intravenous administration of barbiturates to minks was found to be impractical.

Pentobarbital sodium, administered subcutaneously, produced hypnosis satisfactory for examination of the animals, and suitable for artificial insemination studies. The minimum hypnotic dose administered subcutaneously as a 2 per cent solution was determined as 22 mg. per kilogram of body weight.

There was no correlation between sex and dose.

More than ten miles of corridors in the agricultural building in the national capital and over 4,000 acres set aside for grounds and buildings at Beltsville, Md., make up a unit for research and investigation on animal production, the magnitude of which is without parallel in any country.

Hemostatic vitamin K is announced as a possible preventive of cancer. By keeping prothrombin at a high level, it may overcome the action of the cancer-producing chemicals of the body in the same manner as it neutralizes the cancer-causing action of tars.—*Louis F. Fieser, Harvard University, in Science News Letter.*

[3]Nicholas, J. S., and Barron: J. Phar. & Exp. Therap., xlvi (1932), p. 125.

[4]Kennedy, W. P.: J. Phar. & Exp. Therap., 1 (1935), p. 347.

[5]Holck, H. G. O., and Kanan: Proc. Soc. Exp. Biol. & Med., xxxii (1934), p. 700.

SURGERY & OBSTETRICS

Intracapsular Cataract Operation in the Dog*

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A SEARCH of the present literature concerning the nature, occurrence and treatment of cataracts in dogs revealed that little has been written on the subject.

Our primary interest in this article is to discuss certain features in the surgical technic for the removal of cataracts, with the hope that a basis can thereby be formed for further study in this field.

That various kinds of cataracts exist is a recognized fact. In dogs, two main types—the congenital and the senile—account for most of the cataracts found, excluding those due to traumatic causes.

The congenital cataract, as the name implies, may be discovered as soon as the affected puppy's eyes can be examined. Doubtless the best treatment in such a case would be to eliminate the hereditary strain by disposing of the animal. Howevèr, if an operation is decided upon, the needling operation is the one of choice.

In this paper our problem concerns the old dog which has become a family pet and which has developed senile cataracts.

As we examine cases of senile cataracts we discover that there are two main types, the nuclear (fig. 1) and the cortical (fig. 2).

A nuclear cataract is said to occur when an opacification of the embryonic nuclear position of the lens is first to lose its transparency. This nuclear or central opacification may be of variable degrees of hardness. If the nuclear cataract is just forming, it is light gray and is "thin," that is, the fundus can still be seen, though indistinctly, with the ophthalmoscope. A needling operation of the lens may be expected to give a good result. However, if the central lens opacity is of a brownish color, a hard nucleus may be expected. In such a cataract the needling operation is contraindicated because a hard nucleus is not readily absorbed and, therefore, defeats the purpose of the operation.

An operation by the capsulotomy method in cases of nuclear cataracts is not difficult.

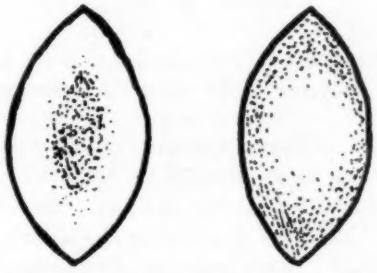


Fig. 1 (left). Nuclear cataract (diagrammatic). Fig. 2 (right). Cortical cataract (diagrammatic). Shaded portions indicate lens opacification.

Briefly, this operation consists of opening the capsule of the lens and removing the hard nuclear portion of the lens by expression. This surgical procedure does not always remove all of the sticky cortical lens substance even when anterior chamber irrigation is employed. The remaining lens substance may proliferate to form a secondary cataract, the lens capsule may become opaque or a phakoanaphylactic reaction may occur.

A cortical cataract is said to exist when the cortex or outer portion of the lens substance loses its transparency. The needling and the capsulotomy operative methods

*Research conducted at the College of Veterinary Medicine, The Ohio State University.

for the removal of cortical cataract may be used, but the method whereby the lens is removed in its capsule is the method of choice.

THE INTRACAPSULAR CATARACT OPERATION

For the satisfactory performance and outcome of the intracapsular operation, attention must be given to the details of the

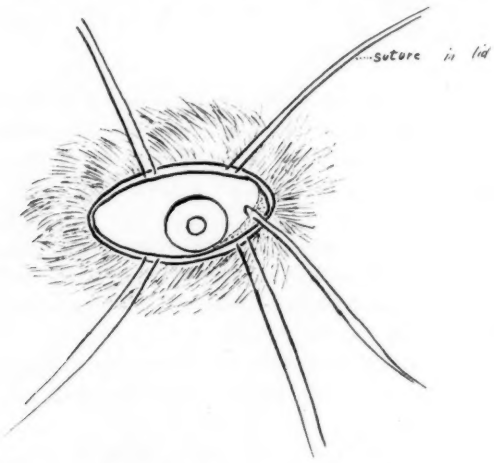


Fig. 3. Diagram showing placement of lid sutures and the suture in the nictitating membrane.

operation. The apparently minor details should not be overlooked or omitted.

Examination of the Animal.—It is assumed that the dog is in good physical condition: This includes freedom from rhinitis, absence of tear-sac infection and a conjunctiva free from inflammation. If such conditions are present, they should be corrected before attempting the operation.

Anesthetic.—Our first consideration in preparing for the operation was the choice of anesthetic. The inhalent anesthetics presented certain difficulties, namely: The cone used for the administration of the anesthetic was mechanically in the way of the operative field, and recovery from the anesthetic was frequently accompanied by nausea and emesis, which with associated straining or retching may prove harmful to the operative results—indeed, may be the cause of losing the eye by collapse, hemorrhage, iris prolapse or retinal detachment. A local anesthetic, obviously, can not be used.

The intravenous anesthetic was found to be ideal, permitting complete freedom in the operative field and giving perfect anesthesia with little or no after effects as the patients regained consciousness. We used nembutal, 1 gr. (1 cc.) per 5 lb. of body weight.

Mydriatic.—In all cataract surgery a dilated pupil facilitates the operation. If adhesions between the iris and lens exist, certain difficulties may be anticipated because the finding of posterior synechiae indicates the existence of a previous inflammation of the iris. It was found that atropine sulfate 1 or 2 per cent instilled in the eye (cul-de-sac) at intervals prior to surgery dilated the pupil satisfactorily, but this effect was promptly lost when general anesthesia was produced by nembutal given intravenously. This difficulty was overcome by injecting atropine sulfate, 0.5 cc. of a 0.3 per cent solution, intravenously shortly after the nembutal was given. This dosage was found adequate in all cases.

Antisepsis.—With the problems of a suitable anesthetic and obtaining a dilated pupil overcome, the next consideration was what should be regarded as adequate antisepsis. As a general rule, chemical irritants, caustics such as silver nitrate or solutions containing alcohol should not be used. The following technic was evolved. Where hair interfered mechanically in the operative field, it was clipped off but not close enough to abrade the skin. The field was then carefully washed with ivory soap and tap water applied with small wads of cotton, and rinsed with tap water. Argyrol 20 per cent was instilled in the eye, allowed to remain a few moments, then irrigated with sterile water until none of the brown stain remained. Argyrol is noncaustic and the silver in it combines protein-mucus, bacteria and foreign matter, forming a silver protenate or coagulum which can easily be washed away. The argyrol was instilled in the eye a second time and the irrigation repeated. A rubber ear syringe is useful for the irrigation. Sterile towels or drapes were then placed over the animal. Several

folded towels placed under the animal's nose will often give better position to the eye for operation.

Hemorrhage.—Hemorrhage can give the operator many an anxious moment and must be avoided or controlled. This is especially true in cataract operations. After various methods were tried, a combination of two

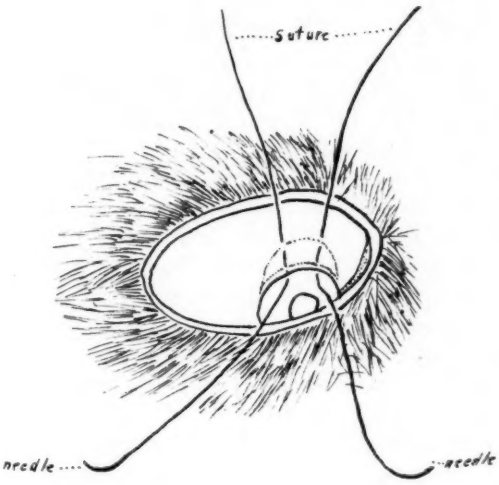


Fig. 4. Diagram showing placement of stay sutures. Dotted line indicates edge of cut conjunctiva.

was found to give excellent results. In the vicinity of the expected incision a subconjunctival injection of cocaine sulfate 2 per cent and adrenalin chloride 1:1,000, approximately 3 minims each, is made so as to raise a small bleb in this area. This is helpful, but it is not adequate. A pledget of cotton or a cotton applicator moistened with adrenalin 1:1,000 is held under the closed upper lid and against the globe for a minute or two. This will result in a bloodless field.

Lid Sutures.—A curved cutting eye needle threaded with No. 2 black silk is used double for the lid sutures. The lid is grasped between the thumb and index finger and the needle is passed through the lid margin parallel to the skin surface, not through it. A firm bite should be taken. Usually four sutures, one each at the inner and outer third of the upper and lower lid, are sufficient. These sutures serve a dual purpose: (a) keeping the lids apart during the operation and (b) "splinting" the eye when closed at the end of the operation. (See figure 3.)

If hemostats are attached to the end of the sutures and allowed to hang over the animal's head (or they may be clamped to the sterile drapes) the lids will be held apart, thus obviating the need of an eye speculum. Attention is again called to the fact that the suture does not pass through the conjunctiva or skin, but through the margin of the lid. Thus when at the end of the operation the opposing sutures of the upper and lower lids are tied (using a surgeon's knot), no thread rubs on the cornea.

The nictitating membrane is kept out of the way by passing a suture through it,

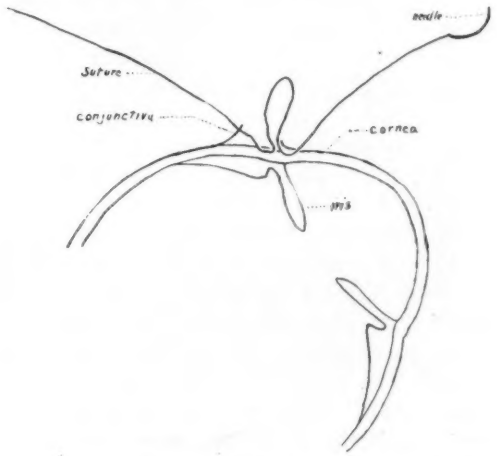


Fig. 5. Cross section of figure 4.

near the margin, and fastening a hemostat to the suture in the manner described above.

If the palpebral fissure is too narrow, this space between the lids may be widened by a canthotomy. Prior to cutting with scissors the outer angle of the lids, a small quantity of novocaine and adrenalin should be injected to assist in controlling hemorrhage.

Conjunctival Flap.—As soon as our patient awakens from the anesthetic, he will get up and move about. It is, therefore, necessary to have a secure closure of the incision at the end of the operation. It was found that the conjunctiva would

stretch if this membrane alone was sutured and a firm closure was not obtained.

The following technic for closure is suggested at this time, as the sutures are placed before the incision is made. A conjunctival flap, 2 mm. from the limbus, extending from 10 to 2 o'clock, is dissected down to the cornea. With a Davis & Geck suture No. P 242 (a traumatic needle on size 8-0 black silk), the needle is passed through the margin of the conjunctiva, carried through 1 mm. of episclera, at about 1 mm. from the limbus, then through the edge of the cornea. The thread between the episcleral corneal bits is looped out of the way so as not to be cut when making the incision. The sutures are left untied. (See figures 4 and 5.)

The Incision.—The globe is held steady by applying fixation forceps close to the limbus either below at the 6 o'clock position or above at about the 2 o'clock position. The keratome (lancet) is held in the right hand between the thumb and first and second fingers, while the little finger is steadied against the head. The eye is rotated downward with the fixation forceps. The point of the knife is placed at the corneo-scleral junction (limbus). By slight pressure the point penetrates and enters the angle of the anterior chamber. As the incision is enlarged, the surface of the blade must be kept parallel with the iris, pushing downward until the point has passed two thirds of the distance across the chamber. The knife is then slowly withdrawn with the blade parallel to the iris, avoiding injury to the lens or cornea. During the incision the keratome must not be pressed backward against the sclera as this will cause the wound to gape and the aqueous will flow out, making further surgery more difficult. The beginner is to be cautioned against the common error of pressing upon the eye with the fixation forceps instead of pulling slightly forward, an error that may cause unpleasant complications. The incision is enlarged with Stevens scissors until it includes slightly more than one third of the corneal periphery. During this procedure much of the aqueous will flow out of the incision and care must be taken to avoid injury to the iris. The scissors blade which is inserted into the anterior chamber should be kept close in the angle of the anterior chamber. It may be found advantageous to remove the fixation forceps before enlarging the incision with the scissors; if not, the forceps should be removed immediately after the enlargement. Care must be used to avoid cutting the previously placed sutures.

Iridectomy.—If the pupil has remained well dilated, one may elect to remove the lens at once. However, if the iris has contracted and the pupil is small, an iridectomy should be done.

With the closed iris forceps held between the thumb and first finger of the left hand, the forceps are introduced through the incision from above—between the two previously placed sutures and in front of the iris to the pupillary margin. The forceps are opened slightly and a narrow fold of the iris seized, drawn out through the wound and cut off with a DeWecker or Stevens scissors held in the right hand.

The reposition of the iris is accomplished with the iris spatula, which is held parallel to the plane of the iris and pushed carefully through the lips of the incision, carrying the iris before it, moving toward the center of the pupil and stroking the iris into its proper position. The pupil should now have the appearance of an inverted keyhole.

Delivery of the Lens.—With an intracapsular forceps held between the thumb and first finger of the left hand, the closed blades are inserted through the wound into the anterior chamber. The blades are opened slightly and a small fold in the anterior capsule of the lens is grasped. A squint hook or lens scoop held in the right hand now exerts a downward pressure at or just below the limbus, to break the zonular fibers. The left hand guides the lens directly upward through the pupil, being gently massaged and pushed by the squint hood held in the right hand. This action must not be forceful, for, if it is, the capsule will be torn. Because of the large size of the anterior chamber and lens there is little danger of losing vitreous as compared with the human eye. As the lens presents itself

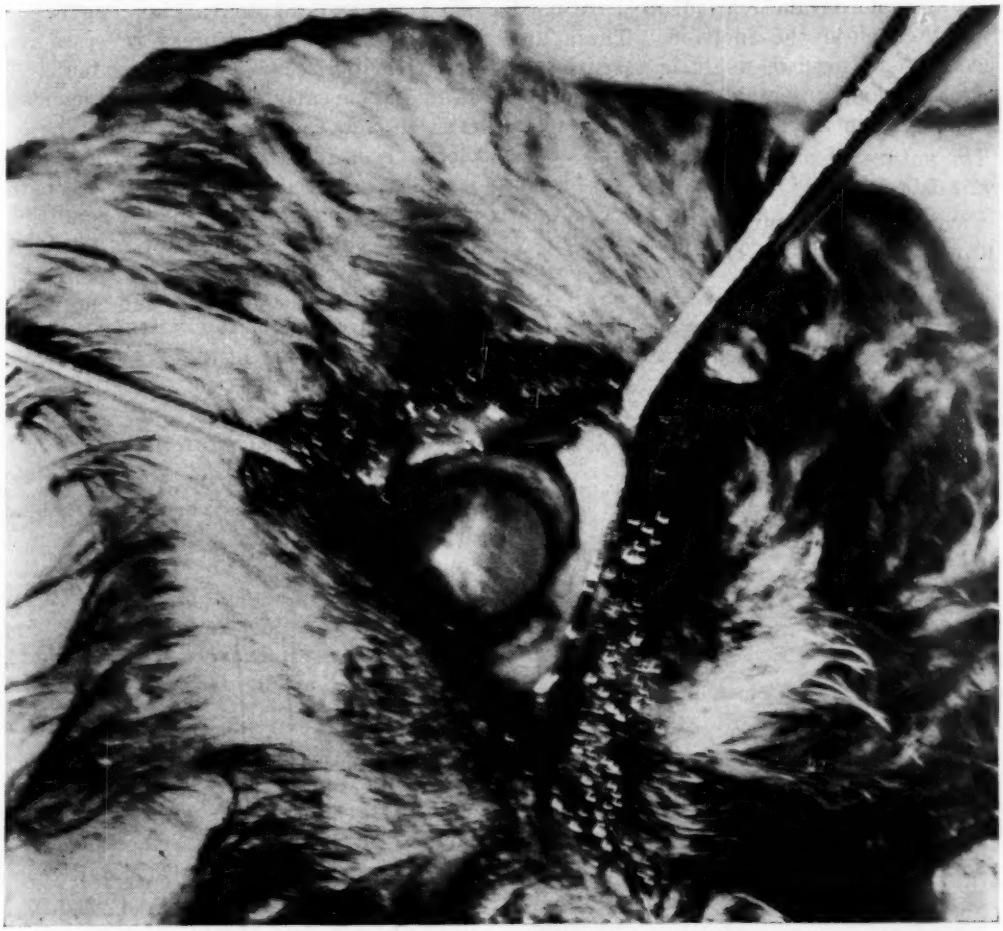


Fig. 6. Senile cortical cataract before operation.

in the anterior chamber, through the pupil the counter pressure follows at the edge (equator) of the lens, not over the lens, while it is slipped out through the incision. The iris may also float into the incision and require replacing with the iris spatula as described before. The end of the iris spatula should be kept back of the pupillary margin, thus avoiding puncturing the hyloid membrane and releasing the vitreous.

If an iridectomy has not already been done, it should be attempted at this time. A peripheral iridectomy will accomplish our needs and keep the sphincter muscle of the iris intact. The iridectomy is accomplished as described above except that the iris fold is picked up near the peripheral third and snipped off, leaving a button hole at the base of the iris. The iris is replaced in its normal position with the iris spatula as described above.

The anterior chamber may be restored from its state of partial collapse by injecting a normal saline solution. An anterior chamber irrigator may be purchased or one can be made by bending to an obtuse angle the tip of a glass eye dropper and inserting the opposite end into a rubber ear bulb syringe. Care should be exercised not to extend the nozzle beyond the pupillary margin of the iris.

The episcleral-corneal sutures may now be tied with a surgeon's knot. The suture should be drawn just tight enough to approximate the margins of the incision without causing wrinkling of the cornea.

Additional conjunctival sutures are used to further close the incision. These are placed where needed, as it is essential to make as nearly a complete surgical closure of the incision as is possible.

The suture through the nictitating membrane is removed.

Bichloride of mercury 1:3,000 ophthalmic ointment is instilled. The lid sutures are

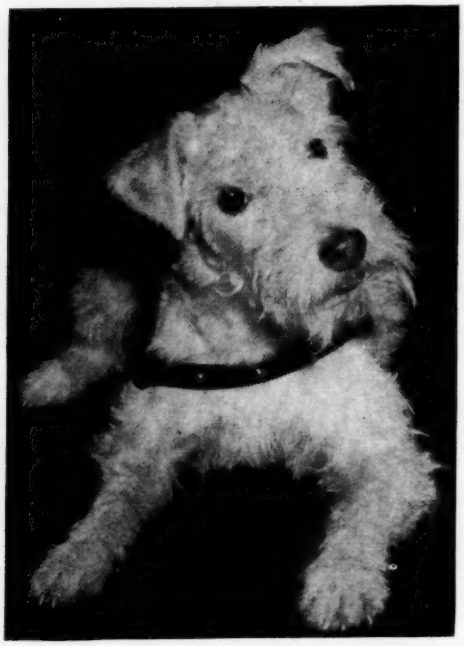


Fig. 7. Same dog as in figure 6 six months after both eyes had been operated. A faint loss of corneal transparency is still noticed.

tied, the upper to the lower. When the sutures have been properly placed and tied with a surgeon's knot they may remain in place from three to five days before pulling out. They are left in as long as possible. Eye pads are applied to both eyes and bandaged in place in the usual manner.

On the third post-operative day the bandage is removed. The lid sutures are not removed unless they have cut through. Atropine 1 per cent and bichloride ointment are instilled daily.

About one week after the operation an opacification of the cornea frequently takes place, progressing to varying degrees, but in most cases this process reverses itself and clearing occurs to some extent. The animal apparently benefits by the operation, even though the clearing may not be complete. It is felt that since lack of vision in senile cataract cases seemingly is permanent, operation for relief of the condition is justified even if partial vision is established in only a small percentage of cases. Further study of this phenomenon and methods to overcome it is necessary.

Useful Drugs (?)

Commenting upon a complaint from Great Britain that certain well-known drugs are now difficult to obtain on account of war conditions, Dr. Hobart A. Reimann* of Philadelphia writes: "If the present war has no other good effect, it may at least serve to renovate some of the time worn habits in British therapeusis."

The drugs mentioned as being scarce are balsam of tolu, buchu, calumba, gambir, gelsemium, jalap and snake root. Since none of these drugs or preparations is described in the U. S. Pharmacopoeia or included in New and Non-Official Remedies, the editor adds: "The points raised by Dr. Reimann are well taken. It may be, however, that our English friends are more accustomed to the use of these drugs and therefore lack of them may mean a hardship to those so accustomed."

The drugs here named are among the well-known friends of the old veterinarians which even the veterinary doctors of this country have long since discarded.

Says *Food Field Reporter* (Sept. 30, 1940): "Fruit growers of British Columbia, Ontario and Nova Scotia are turning heaven and earth to get an embargo placed by the Dominion Government on all exports of fruits and vegetables from the United States."—*From Daily Digest, USDA.*

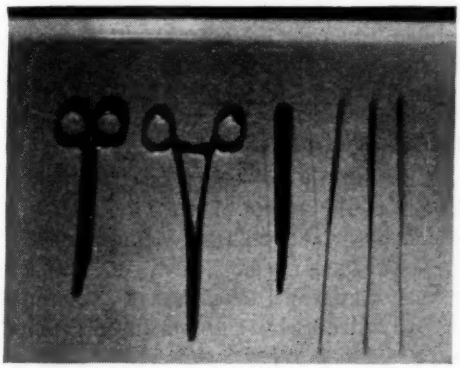
*The Journal of the American Medical Association, cxv (Dec. 7, 1940), p. 2016.

Ablation of Canine Anal Sacs

A. R. THEOBALD, D.V.M.
Cincinnati, Ohio

I HAVE FOUND the following indications for the surgical removal of anal sacs: (1) recurring abscessation, (2) chronic overdistention of anal sacs, (3) proctitis and fissured anus when these conditions are traceable to anal sac abnormality, and (4) relief of odor in old dogs when anal sacs are responsible.

The instruments needed are three metal nasal cotton applicators, (one fine, one small and one medium in size), a Bard Parker knife and No. 15 blade, an artery forceps with single tooth, and a pointed curved scissors.



Instruments used in removal of anal sac. Right to left: three nasal applicators, Bard Parker knife, artery forceps, scissors.

PREPARATION OF PATIENT

General and complete anesthesia is necessary, but before giving the anesthetic one should be certain that the colon is empty. The rectum and colon may be plugged with cotton or lamb's wool to prevent seepage during the operation. The hindquarters are elevated, with the chest resting on the table, and an area about 4 in. in diameter around the anus is clipped and shaved. The area is then washed with soap, and alcohol or any antiseptic solution is applied. Strict asepsis here is neither possible nor necessary. The anal sacs are expressed, or washed out with an anal sac irrigator, with water. If irrigated, avoid leaving an excess of fluid in the sacs. With the cotton applicators make small cotton swabs, introduce them through the anal sac opening and push them off into the sac. The object here is to disengage the cotton in a manner to keep it retained in the sac. Fill the sacs until they will hold no more cotton, or at least until they are well distended. Methylene blue or any stain may be introduced to color the cotton and thus aid one in identifying the thin sac.

METHOD OF OPERATION

With the distended anal sac firmly grasped between the finger and thumb, cut down upon it through the skin and subcutaneous tissue. An incision about an inch long is all that is necessary in the average case. Continuing your hold, dissect to expose a reasonable amount of the distended sac. Then grasp the sac with the artery forceps. Traction backwards of the sac is now possible, and by further dissection the anal sac can be freed of muscle fibers. Dissection here is difficult; the muscles are thin and should be scraped off the sac with a new No. 15 Bard Parker blade. It is important in scraping off the muscles that damage to the rectal wall is avoided. Such

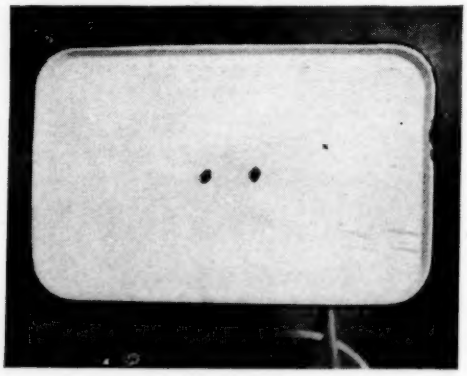
Distended anal sac.

damage could result in fistula. Hemorrhage is slight. Since the operator has both hands engaged during the dissection, an assistant should do the swabbing. With scissors re-

Anal sac exposed.

move the sac as closely as possible to the orifice of the duct of the sac. Have no fear about cutting or destroying a small part of the ani sphincter muscles.

Sutures and after treatment are not nec-



Anal sacs after removal.

essary. Healing is rapid. Patients are able to go home three to five days after the operation. Defecation is normal, and stricture will not result.

A cow weighing 1,000 lb. has about 50 lb. of bone, a large part of which is phosphorus. Phosphorus is also contained in the soft tissues and body fluids. For milk production phosphorus should be 45 per cent of the total intake of minerals, that is, four fifths of the calcium requirement. —*L. O. Gilmore in Hoard's Dairyman.*

Entomologists Use Special Cameras to Clock Speed of Ticks

Entomologists of Bronkhorstspruit, South Africa, are using special optical instruments to study the habits of ticks. The camera-like instruments are trained on a given area of ground and the observer notes on frosted glass how many ticks cross the area during the period of calculation, what they do or how they lie in wait, at what distance from an animal they first become aware of its presence and at what speed they travel toward the animal.

In one study 97 ticks of four different species crossed an area of 25 square yards in 15 minutes and became aware of oxen driven to within 40 yards of them. They traveled toward the animals at a rate of 4 inches a second, or 20 feet a minute.

Versatile Vitamin B

According to the most talented specialists the usual intake of vitamin B is below the amount required for optimal growth of the young and good health in the adult. It was a mistake to measure the amount the body needs by the minimum amounts required to prevent beriberi. "Perhaps," says Borsook in the *American Journal of Digestive Diseases* (June 1938), "to postpone senility in the adult human, four or five times that amount may be required."

Among the clinical states for which vitamin B or some of its fractions may be prescribed in veterinary medicine are:

Asthenia	Hyperthyroidism
Anemia	Myasthenia
Anorexia	Navel-ill prevention
Blacktongue	Nervousness
Bloating	Paraplegia
Chastek paralysis	Relapsing convulsions
Constipation	Running fits
Diarrhea	

To prevent vitamin B therapy from becoming a discredited cure-all, keeping these conditions in mind is advisable. All species of higher life require a minimum amount of this vitamin to keep alive and optimal amounts as yet unknown to support growth, health and longevity, but this does not signify that every state of organic and functional depression is avitaminosis B.

EDITORIAL

"Hoss" Doctor (A Book Review)

"HOSS" DOCTOR is the autobiography of a native New Englander interwoven with folklore of the people he encountered as a practitioner of veterinary medicine in rural Massachusetts. Rural, urban, industrial and political Massachusetts is tangled into a vague story of the author's professional life.

In bent, the book swings between criticism and narrative, not without some bitterness. The general theme is the status of veterinary practice in Massachusetts as seen through the eyes of a country practitioner and arranged in well-told epics of this veterinarian's experiences with poor farmers, prosperous farmers, large dairy interests, big business, idle rich and college professors, ostentatious physicians, broad-minded physicians, shady policemen, chiseling lawyers, self-made horse and dog doctors, growling and happy clients, frugal Yankees, producers of dirty milk, objectors to sanitary milk laws, and last and uppermost, incompetent directors of livestock sanitation, of whom Massachusetts would seem to have had more than its share, contrary to impressions beyond its bourn.

UNFAIR TO HIS STATE

The book runs contrary to general impressions in regard to livestock sanitation. To the outsider, Massachusetts has been a pace maker in this connection—shades of Wood, Thayer and other pioneers in animal-disease control, who in eradicating contagious pleuropneumonia of cattle in the middle of the 19th century set an example that led to the extermination of that plague from the whole country some years later and thus incidentally glorified their state in the annals of veterinary medicine. And, what of Winchester, pioneer in bovine tuberculosis eradication, whose teachings are seen in the completion of that memorable task in 1940.

The author's attack on the program of bovine brucellosis eradication, although unfortunate, is but history repeating itself. In great undertakings of this sort involving a basal national industry, there are many ramifications a private practitioner of one region may overlook in passing snap judgment on the *status quo,* ramifications to be strategically maneuvered to accomplish the end. Quarreling with officials and regulations is a dubious prerogative, for without these the country would be suffering in the throes of a hopeless situation, needless to describe to connoisseurs of the disease potential in domestic animals. The author does not take into consideration that without direction, practitioners, essential and efficient as they are, would be as helpless, inert and incompetent as soldiers without officers to command their operations from a full view of the big picture, as the generals say.

Anyhow, broadcasting our dissenting opinions in these respects to an uninformed public is not good strategy. If there is personal gratification in scolding one another over the great problems thrown upon our laps to unsnarl, that is outweighed by the damage done in telling people about our intramural controversies. Neither veterinary science nor its application can be advanced in that way, as much as "kicking" among ourselves may be wholesome in democracies. Moreover, comparing Massachusetts with Spain in the days of the Inquisition is pretty far-fetched, to say the least.

TECHNICAL ERRORS

"Hoss" Doctor has its technical infelicities which the lay reader may or may not notice. Playing up "myriads of streps" as

the specific cause of canine distemper can be overlooked in reading material intended to shape public opinion, yet technical accuracy would have served the same purpose for laymen. Contracting Weil's disease at dog shows is dubious reasoning in view of the known pathology of this new visitor to dogdom.

In setting the efficiency of vaccination against bovine brucellosis at 98 per cent for adult cattle and 100 per cent for younger ones, the author creates a false sense of security that is not supported by the extensive observations of federal and state governments. Regardless of the many favorable observations in the field of practice, live-culture vaccination does not seem to have reached that utopian level, although its popularity is rising.

The author calls Epsom salt a gastrointestinal irritant and calcemia a disease of cows. As many reasons as there are to praise this book, technical mistakes can not be overlooked.

Story Well Told

The author, at the age of 16, ran a livery stable for his ailing father who knew things about horses besides running the depot hack and town patrol wagon. Experiences as liveryman, expressman and hack driver led this intrepid lad to give up the notion of studying medicine and to enter the veterinary department of Harvard University, where he was taught by such celebrities as Theobald Smith, C. P. Lyman and F. H. Osgood. The Harvard veterinary students are highly rated; in examinations common to medical and veterinary classes, they made good grades, and they were fortunate to have the opportunity of attending clinics at the Massachusetts General Hospital given by distinguished surgeons.

The trials of a young graduate entering practice without capital among the rural folks of Massachusetts at the turn of the century are well told. That there were difficulties ahead for "collidge eddicated" men entering virgin territory is a well-known fact of American veterinary history. Only dirty old men in shaggy raiment were trusted to "doctor" horses. Youth, knowledge and respectability were disadvantages that the folks could not reconcile with "horse doctoring." Hundreds of living veterinarians will praise the author for reminding the world of their early experiences.

Neighborhood gossip about one's private affairs, the greed of public service corporations in such trivial matters as installing a telephone, the ways of scheming lawyers, local physicians, horse gyps, and the political interference with veterinary practice, fill the book with material that none but a busy veterinarian of the horse and buggy days could have written.

Full of Philosophy and Catchy Episodes

"Horse doctors have died out faster than horses," "Veterinary medicine is the proving ground of human medicine," "Some dogs are great disciplinarians . . . some are great comedians," "Surplus milk is a racket," "While the Yankee farmer may not be honest in a horse trade, none ever cheated a genuinely poor man; their tricks are lily white compared with some things big business men do," "Poverty is a man's own fault," are random pickings.

Throughout, the text is a reminder that the veterinarian in mixed practice leads a colorful career. He meets people in all walks of life and, as a rule, at times when they are most apt to assert themselves. An example to single out is the physician who raised a big rumpus in trying to prove that his patient in the house had glanders contracted from a snotty-nosed horse in the stable which the author had diagnosed sinusitis from a decayed molar. The physician demanded the vested authorities (federal and state) to make three mallein tests (all negative) before he and the aroused neighborhood could be appeased. By contrast, another physician sought the author's opinion on a case of eczema in the owner of a horse genuinely affected with glanders, just to make sure that there was no relation between the rash in the house and the farcy buds in the stable—a rational precaution in the days preceding serological tests. These two episodes distinguish between the

physician who high-hats the veterinarian and the one who honors his ability and training.

FLING AT DAIRY INSPECTION

The private practitioner in altruistic mood who takes a job as dairy inspector among his clients at $1,200 a year as a sideline will do a lot of good for an unappreciating public, but he will sacrifice some of his good customers and will have to do a lot of debating and coaxing to have the necessary improvements installed. It appears that it is only when dirty milk touches the pocketbook that milk folks will condescend to institute reforms in their *modus operandi*. Much of this reform is made at the expense of the inspector's private practice. At least, that was the way it worked out with the author of *"Hoss" Doctor*.

"GONE TO THE DOGS"

Book III is the story of the decline of horse practice and the accession of canine medicine which led to the building of a $25,000 hospital that did not pay and the cultivation of knowledge and skill in another field. Here the author meets a new type of self-made doctor, the kennel man who was on the job before the large animal doctors paid much attention to the details of the canine problems and who naturally remained as the nemesis of the new intruder—the horse doctor suddenly transformed to dog doctor.

In the new realm it was necessary to fathom more and other kinds of human nature—the human nature of high society which is something quite different from that of the horse and cow man. Treating dogs in the homes as an incident of mixed practice is one thing; taking them body and soul to a hospital is something else. Hysterical women of the new-rich gentry insisting upon seeing their dogs in the middle of the night or calling up every half hour to know how Putsy is getting along are but two of the minor vexations encountered in making the shift from horse to dog. Mingled among these, however, were the golden-rule type of clients to make life easier. On the whole, *"Hoss" Doctor* is not at all eulogistic toward the dog-owning public or to dog practice. Chastised are the kennel men, the pseudo-dog doctors, the misinformed owners, and the purchasers of stolen dogs in the research laboratories.

The sum of all this experience was that the hospital did not pay, and it was never fully equipped. Large animal practice was the author's love and there he remains and shall remain, for, and we quote, "My work is my life and it has been a forty-year holiday."

Dinsmore's book lays bare the innermost character of so many phases of American life that it quickly caught the eye of book reviewers throughout the country. On that account, *"Hoss" Doctor* is assured a place in many a library. Quoting from *Wallace's Farmer:*

> Every farmer who has felt gratitude to a veterinarian who has saved a horse or cow or hog; every farmer who enjoys the record of the veterinarian's battle with disease and with human and animal cussedness; every farmer who remembers the "Doc's" stories of the livery stable office—all of these will have a fine time with this book. . . . Most farm men would have a wonderful time reading this book and talking it over afterward. We hope a lot of them will get hold of it this winter.

Veterinarians in every branch of the service should read and weigh this quotation. It portrays the public's appraisal of the veterinary service. As if stung by Dinsmore's frequent use of the term "horse doctor" and by the title he chose, the veterinary press and some veterinarians have been less eulogistic than the lay critics who have reviewed this book. Not being allergic to the term "horse doctor," these reviewers (*vide*, above quotation) regard our prosaic origin as a compliment—a compliment to a stoic profession that has won a high place in the country's affairs. To them, the livery stable as a birthplace is a symbol of the Sacred Manger of nineteen hundred and forty years ago. No persons, crowd or creeds that amount to anything can ever hide the place of their birth. On the contrary, the greater they become, the more often will their birthplace be written into the pages of history.

One must pay tribute to Mary, the au-

thor's faithful wife and helper, cheerful, tireless, uncomplaining servant of the household and telephone. Mary symbolizes the spine and the soul of many a veterinary practice. Without her, the author's career would certainly have been an uphill drag without remission. [*"Hoss" Doctor. By R. J. Dinsmore, M.D.V. Cloth. 311 pages. Waverly House, Boston. 1940. $2.75.*]

Promiscuous Vaccination Disapproved

WE DO NOT believe in promiscuous vaccination [bovine brucellosis], using vaccines from all sources and of unknown value, but rather the vaccination of calves in herds where there seems to be an infection that is hard to locate by testing and where the disease persists year after year even though animals are tested and eliminated. We believe that when calves in such herds are vaccinated it should be done under the supervision of a well-qualified veterinarian and the vaccine should be selected from a laboratory under the supervision of the United States Bureau of Animal Industry. It is nothing short of criminal to make a vaccine in a haphazard way and distribute it over the country to be used by inexperienced people.—*Hoard's Dairyman, October 10, 1940.*

The veterinary profession appreciates the confidence in qualified veterinarians expressed by *Hoard's Dairyman,* but inasmuch as all vaccines entering interstate trade, and that means all of them commonly used on live stock, are made under federal supervision, there is little fear that inferior products of the type mentioned will ever be used on a large scale. Obviously, the close and constant supervision of biological products made for use in domestic animals and the specific directions governing their production, storage, dating, numbering and distribution are none too generally known by persons other than the makers and professional users of them.

Among the disputed points in bovine brucellosis control, the danger of inferior vaccines is a thing of the past, but "promiscuous vaccination" is a problem that remains to be solved. There is no other country in the world where the making of biological products is as meticulously directed, yet conversely, this is the only country we know where their distribution and use is unrestricted. It is gratifying, therefore, that influential editors are beginning to emphasize the fact that the usefulness of biological therapeutics lies not in the use of the hypodermic syringe, but in the knowledge of disease.

The Milk-Inspection Project

One of the projects occupying the attention of the executive office is the development of a closer relation with the United States Public Health Service in its program of expanding adequate milk inspection. A prominent veterinarian representing that service interviewed for the purpose of formulating plans that would tend to bring local veterinarians into the general scheme of expansion expressed regret that sanitary engineers are taking more interest in the work than members of his own profession.

Where schools have been held under the sponsorship of state units of the federal service for the purpose of training milk inspectors, few veterinarians have enrolled for the course. At one of these schools held adjacent to a veterinary college, neither a veterinary student nor a member of the faculty attended.

Obviously, owing to lack of interest, a huge field opening up to the veterinary profession is being exploited by nonveterinary specialists who, this representative admitted, are not as well grounded for the study as the graduate of veterinary medicine. Otherwise stated, it is easier, for example, for the graduate in veterinary medicine to master the essential details of pasteurization than for the mechanical engineer to qualify in that part of veterinary science concerned in the production and distribution of wholesome milk.

A complication to overcome is the fact that the public health service frowns upon the part-time milk inspector whom the veterinary profession points to, on economic

grounds, as the logical person for the small municipality to employ for that position.

The situation is one for organized veterinary medicine to study, faithfully. In opening up a new field such as this a profession can not be expected to be marking time ready to march in and take hold. There is a lot of educating to be done on the part of all concerned: the public, the health officers and ourselves.

The veterinarian's part as seen from the Association's office is to aid the public health service, not to stand by watching a gigantic system of food inspection develop before our eyes without donating to the people of our respective communities the benefit of the college training and experience we have acquired in animal medicine.

That expertness in milk inspection requires graduate study is admitted. But, in that respect the specialty does not differ from others. Expertness is acquired by g r a d u a t e , not undergraduate w o r k , whether it concerns internal medicine, surgery, research, education or what not.

Two immense fields of practice are opening up at this hour. One is poultry practice, the other is food inspection. We have the choice between stepping in now or staying out until it is too late to overcome the damage.

Col. Walter Fraser (1872—1940)

COLONEL FRASER, who died in San Diego, Calif., September 27, 1940, was one of the few remaining officers of the veterinary corps who served in the mounted units of the military forces before commissioned rank was granted to the army veterinarians. He was born in Iowa in 1872, graduated by the Chicago Veterinary College in 1900, joined the army in 1903, served with the cavalry army until 1917, when he was commissioned first lieutenant under the congressional act of 1916 which the AVMA had fought for through many years. With the rank of major he served in the AEF mainly as an adviser at GHQ and after the War served four years (1930-1934) as chief of the veterinary division of the Surgeon General's office. He was placed on the retired list in 1934 after a short tour of duty at the Presidio of San Francisco.

As army veterinarians before the World War had neither grade, rank, rights nor well-defined status, the rise of Colonel Fraser from nothing to the high office of chief can be singled out as a symbol of the long struggle of the national association in behalf of the movements which have uplifted veterinarians from the abject humility of the past to the level of distinction and honor.

Col. Walter Fraser

If some of the old group of the noncommission days who were lifted automatically by law to high rank and high pay in retirement did not reciprocate before and after retirement by remaining in the membership of the Association in the spirit of gratitude, the majority showed lifelong appreciation of the uplift and, needless to say, the country, the army and the veterinary profession are thankful for the reform. The services of the veterinary officers in food and forage inspection save millions for the producers, insure against unfit food for military men and their animals, and they have stepped up the standing and morale of every branch of the civilian veterinary service, without exception.

Public Remains Uninformed

A LETTER from a member draws our attention to recent movies and press articles which jokingly set the veterinarian in a place of introversion in the catalogue of professional men. Our correspondent wonders why his profession should be such a good subject for the humor of the script writers, editors, columnists and reporters. The answer is easy. We are still seen through eyes unaware of the evolution of medicine, particularly our branch of it.

The quackery of the 19th century, not the situation of the hour, lives in the minds of the people. When physicians were made in the doctors' offices, dentists just happened, lawyers didn't bother about going to college, and veterinarians were home made, was not so long ago. In veterinary medicine, there are still many ways to take a fling at treating the sick without the orthodox training set down in the codes of our organizations. If the related professions have outlived the failings of the past (but have they?) to a greater extent than we, the reason perhaps lies in more resourceful leadership. The public's knowledge of veterinary medicine is vague and remains so because we are not known as a single unit as were the veterinarians of the past. Anyhow, we are not known as a single unit working to a single end.

We meet the public as veterinarians mainly in the rôle of clinicians, when we are treating ailing animals. A large percentage of the profession works at the application of veterinary science practically unseen and under titles that do not identify them as D.V.M.'s. Thrown into a bedlam of charlatanism with no order in sight, the alienation was once a natural sequel of the situation that organized veterinary medicine is now struggling to iron out.

Meanwhile, a great responsibility rests upon the clinical branch—the branch that contacts the public and thereby sets the standards by which all veterinarians are apt to be judged. When the writers write, they write about the doctor of their animals, not about the scientist laboring in the field of research, not about the fighters of animal contagions and inspectors of food, and not about the executives of the system of livestock sanitary science deployed throughout the country in the form of inspectors, who are not thought of as belonging to the same profession as the local veterinarian. But, as implied in our headline, these misunderstandings will not last.

Organized veterinary medicine, young as it is, will soon bring all of these branches together to such an extent that the veterinary service will be identified for what it is. The annual conventiens of the national association through the nationwide publicity they now receive are placing all veterinarians in stronger positions in the public mind year after year. At these conventions the whole story of the veterinary service is told to the whole population by prominent figures in the various branches. A good way to shorten the duration of the growing pains is to give organized veterinary medicine a helping hand. Nothing else can paint the true picture in the public mind of what you are and what you do.

Excellent professors, keen-minded research men, wide-awake livestock sanitarians, capable food inspectors *et al* make up an army of trained technicians about whom the public knows little. Time will connect these with the veterinary service only as fast as the AVMA succeeds in connecting their work with the proficient educational system maintained to furnish them.

Federal Farm Program

THE PROGRAM for aiding farmers is no doubt the toughest one the people have to solve. It is also one of the most important questions related to the welfare of the veterinary profession, difficult as it is to comprehend. The defeat of President Roosevelt by Wendell Willkie in certain states spells disapproval of the farm-relief project of the present time by a majority of farmers. The reason for this attitude in

the Midwest states given by Paul Mallon, well-known columnist of many newspapers, is worth printing in a veterinary journal, and we quote: "The farmers, they say, are tired of county agents, extension workers, and graduates of agricultural colleges such as have been swarming through their fields and bins in recent years."

But Mallon goes on to admit that "the problem is difficult." The loss of foreign markets has greatly complicated matters, and as for curtailing acreage, there is no substitute except quotas, higher loans or price fixing. The farmers detest the latter two. The former is the one that will probably get the farmers' and the government's sanction, this expert analyst of farm economics believes, notwithstanding that such loans are just a subsidy for an otherwise nonsupporting agriculture. What to do with millions and millions of acres now yielding more than the world can use is certainly not a question for political platforms. It is a problem for wise counsel and concerns the whole population as well as the producers of crops. Recollections of 2-cent hogs, 4-cent cattle and 20-dollar horses are what the veterinary profession has to worry about. Cheap animals mean less attention to disease and the implanting of infections which the people may live to regret.

Glass or Paper Bottles for Milk?

HEALTH COMMISSIONER Herman Bundesen and the City Council of Chicago have been waging a five-year war against the use of paper cartons for market milk. The contention is that "bottle" in the municipal regulations means glass bottle and that by no juggling of definitions can it mean anything else.

Says the *Prairie Farmer*, "Despite the bitter opposition of Doc Herman Bundesen's board of health, Chicagoans were privileged to buy milk in paper bottles last week the same as 480 other cities, towns and villages." Federal Judge Woodward granted that right to the dairy company that has fought on the side of the paper bottle.

The battle, however, may not be over. It is alleged that decisions of higher courts will be invoked in behalf of glass.

The opposition of the glass interests is understandable, even pardonable, but the Chicago health department's attitude is not so clear.

The milk bottle that comes to the home is a great traveler. Now it's here, now it's there. It goes from the simplest home of the poor today to the swankiest residence of the wealthy tomorrow. Modern and efficient methods of washing and sterilizing glass milk bottles just before they are filled render negligible the chance of any disease transmission by the multi-use containers, yet there can be no doubt that single-service paper milk cartons have definite sanitary advantages, to say nothing of their esthetic appeal.

The virginally clean throw-away or burn-up paper carton conforms to the teachings and practice of modern hygiene and disease control, much the same as the paper drinking cup of the Pullman, the sanitary towel of the public lavatory and the paper handkerchief of the modern home. And yet, public acceptance of the paper milk container is by no means complete. In the meantime, the proponents of glass containers are not idle. The makers of glass bottles (which were in almost exclusive use for retail deliveries of milk for more years than we care to remember) are carrying on intensive research in collaboration with milk distributors; already notable improvements in the weight, shape and design of glass milk bottles are in evidence.

The final result? We refuse to prophesy; but, from the public health and consumer standpoints, we are certain that benefits will be derived from the keen competition we are now witnessing. May the better container win!

Among the group of enterprises directly concerned in national defense, farming stands at the top in preparedness. Moreover, it is the only industry that has a surplus of needful material.

WITH THE EDITORS

To the Draftees

THE NUMBER of letters received from members of military age since conscription became a law prompts the Association to keep informed on how it can best serve those engaged in developing the preparedness program. Those who have had military experience, particularly on the organization of a veterinary service in the War Department, understand that the use of veterinarians will follow the evolution of the military forces, and that no one can yet predict to what extent the personnel of the veterinary profession will be drawn upon for active duty. It, however, seems quite evident that the civilian veterinary service, in view of its importance in the production of live stock, will not be reduced to the danger point, unless a military emergency arises. The fate of the draftees will depend a great deal upon the recommendation of the local draft boards where registrants are classified.

"Brucellosis" vs. "Bang's Disease"

THE JOURNAL'S contention that "brucellosis" should replace "Bang's disease" in veterinary literature is based upon the multiplicity of names used in the literature in referring to Brucella infections.

In a day's random reading of medical and veterinary journals one can find the following names for the same disease: Malta fever, undulant fever, Mediterranean fever, Bang's disease, contagious abortion, Traum's disease, and brucellosis.

The reason for bringing up this contention again is a query in *The Journal of the American Medical Association* (Dec. 7, p. 2017) wherein a physician says: "There are scattered cases of *abortus fever* among the cows of this region." Thus was added another name for a common ailment affecting many species of higher life which the casual reader may not fully understand. Had the physician said, "There are scattered cases of brucellosis among the cows of this region," his nomenclature would have been universally comprehensive, as all medical nomenclature should be when possible.

It seems to the editors of the JOURNAL that inasmuch as brucellosis is mainly a disease of animals, but one that is transmissible to man, the medical profession will look to us to adopt a name indicating its common bacillary origin, and not call the infection one name in one species and other names in other species.

The objections raised by prominent figures of the veterinary circle to discarding "Bang's disease" we sincerely honor, but we can not condescend to abolish the principle governing the comprehensive terminology of modern medicine. We realize that "Bang's disease" is better known among cattlemen than "brucellosis," but we believe that if cattlemen were taught to think of this disease as an ubiquitous bacillary infection affecting higher life, just as they had to be taught to think of Koch's bacillus, workers engaged in eradicating this microbe would sooner or later remove all of those objectors who once upon a time placed so many obstacles in the path of the veterinary profession in its efforts to make *Mycobacterium tuberculosis* of domestic animals a rare being.

"What's in a name?" Plenty. Perhaps the name itself underlies successful eradication of Bang's disease and its counterpart in man and animals other than dairy cows. General agreement in this respect among us may not be as trivial as it now seems.

Les Docteurs-Ecrivains

RIDING to literary affluence in the medical saddle, as did Oliver Wendell Holmes and Paul de Kruif, is a sport some magazine writers do not leave for those who know

what they are writing about. Just the other day the editor of a popular weekly allowed one of his scribes to tell the world that "no one ever saw a vitamin," albeit the array of bottles on the pharmacy shelf marked ascorbic acid, nicotinic acid, riboflavin, thiamin chloride, *et al.*

There is nothing more delightful to read than the writings of capable doctors who drop the scalpel for the pen in order to tell mankind what the science of medicine is driving at and, *per contra,* nothing is quite as absurd as the ill-informed, hi-yipping wrangler astride the buck-jumping broncho of medical science, untrained in the fine arts of getting on, staying on and keeping out of the emergency ward of the hospital.

Farm Boy—Town Boy

ALTHOUGH the biography of many great men begins on the farm, few biographers have ever stopped to explain the advantages the farm boy receives in preparing for the battle of life. The brains, brawn and the skill required to negotiate the biological and mechanical problems of everyday farming come from practical training the town boy does not receive. The curriculum goes all the way from the wilted potato vine and barren cow to the balky binder and stubborn family car. The farm boy fixes things himself *ex tempore* while the town boy seeks the service of an expert, forthwith. Within reasonable limits both are right. It is as wrong for the farm boy—now grown to manhood—to believe that he is master of the biological sciences as it is for the town boy not to know how to clean a spark plug or fix a flat tire, *ex necessitate rei.*

Vaccination

VACCINATING against infectious diseases has been a principle of prophylactic medicine for a long while. In no instance through the years has any widely used vaccination been discontinued except as improvements have led to the use of newer methods or products. On the contrary, in the effort to control infectious diseases, medical and veterinary science have gone about making artificial immunization more certain and solid. Anthrax, blackleg, tetanus and equine encephalomyelitis are but four among many examples that may be cited. The list is limited only by the actual number of specific and proved vaccines and immunizing products used in human and veterinary medicine.

What the American veterinarian must not forget is that these "vaccinations" have helped to give the American people plenty to eat and the American farmers a measure of the wealth they have. To argue against any legitimate method of vaccination is to lend comfort to the greatest enemies of medical and veterinary science—the antivaccinationists—who would sooner see people and animals suffer and starve than aid in making prophylactic immunization a still greater blessing to mankind.

November First, Nineteen Forty

THE FIRST of November 1940 will be remembered as the day the United States reached a long-sought goal in bovine tuberculosis eradication. When on that date Kings and Merced counties in California were declared modified accredited areas, the work started in 1917 was brought to a status of nationwide attainment.

The event was celebrated by extensive publicity in newspapers, the farm press and magazines. A large book* on the accomplishment giving most of the details was written by an eminent authority on human tuberculosis.

Without notable exception the credit was given to the systematically supervised staff of federal, state and local veterinarians backed by the educational program carried out through stockyard companies, commission men, packers, farm organizations, public health officials, civic clubs, railroads and other agencies, all of which combined to give support and momentum to the project. The first of November 1940 is a truly historic date.

What has been attained must not be jeopardized by complacence or laxity on the part of our legislators, responsible sanitary officials or livestock owners. Effective tuberculosis control work must be continued to guard the tremendous gains made. Eternal vigilance is now, more than ever, the order of the day.

*Man's Greatest Victory Over Tuberculosis, by J. Arthur Myers.

READERS SAY

A Veterinarian's Experience with the Farm Security Administration

To the Editor: In 1936, the Resettlement Administration furnished teams and supplies to tenant farmers (in Mecklenburg and Brunswick counties, Va.). The teams were sold on note and the resettlement representative instructed these clients that if the animals needed medical attention before they were paid for, a veterinarian should be called. I did this work and the local agent stationed in my town gave me orders as to all calls to be made. My statements were sent to him for approval and he forwarded them to the Richmond, Va., office, from where my checks were mailed.

When this agency became the Farm Security Administration, I was not notified of the change, and the representative under whom I worked for the Resettlement Administration continued to send me out on calls. My checks stopped coming through, however, and I asked the representative for an explanation. "You have been getting your checks," he told me, "and I guarantee that you will get these." But he was discharged and I did not get them.

Twenty-two clients owe me $223.60 and the Farm Security Administration office in Richmond says that it is not responsible for its representatives' orders. The clients can not pay me because the present representative requires them to bring him all checks for crops sold. Furthermore, the present representative has shown me no consideration in collecting these bills.

D. W. McTyre, *Virginia.*

Livestock Editors Need Veterinary Counsel

To the Editor: Why is it that the veterinarian is ignored by some editors of agricultural and livestock magazines? Is it because of ignorance or design? Surely, no one could be better qualified to advise breeders than the practicing veterinarian.

If editors of livestock magazines desire to give sound advice to their readers, they should direct them to authoritative persons for information, not to individuals with only a smattering of knowledge.

W. R.

Bang's Disease vs. Brucellosis—Argument 3*

To the Editor: Some time ago I received a copy of a letter addressed to you by Dr. C. R. Donham which discusses the inadvisability of changing the name of Bang's disease to brucellosis.

I completely agree with Dr. Donham and regard it as undesirable to attempt that change. When the name was changed from contagious cattle abortion to Bang's disease, it took a number of years for cattle owners to become accustomed to it. Now, livestock owners generally know what Bang's disease signifies. If a change were made, it would take them a long time to become accustomed to the new nomenclature, and it would cause a lot of confusion during a period when much is being done in connection with suppressing the disease.

Furthermore, the name Bang's disease is a simple one, forming a convenient label for a disease condition. The word brucellosis, in my opinion, would not be as convenient a name from the owner's standpoint, for he would have difficulty in pronouncing and using it. W. Wisnicky, *Wisconsin.*

Tobacco dust, 4 lb., fresh hydrated lime, 1 lb., and a gallon of water, allowed to stand 24 hours and strained, is used to kill warbles in India. The liquid is applied to the warble with a sponge or brush.—*From The Indian Veterinary Journal.*

*See December 1940 issue, page 627.

CURRENT LITERATURE

ABSTRACTS

Public Health in National Defense

The American Public Health Association is 69 years old and has 7,000 members, among them many capable leaders ready to serve the country in any emergency where maintaining public health is primarily imperative. In the last few years, this organization has stabilized the public health program, nothwithstanding the social, political and economic factors that have to be considered in the application of modern medical knowledge to modern ways of life. The span of human life has been increased and the average person feels more secure against death from disease.

The subject of public health is especially significant since the whole world has become an armed camp and multitudes in various countries are undernourished, from the standpoint of scientific nutrition at least; and this factor may profoundly affect the structure of future civilization, along with the physical and mental strain and the dislocations of family life the population may have to endure. In any event, the nutritional status of a nation's population will be a determining factor in times of stress and emergency. [*W. S. Leathers. Public Health in National Defense. American Journal of Public Health, xxx (Nov. 1940), pp. 1269-1275.*]

Grubs in Minks

The adult parasite is a fly (*Wohlfartia vigil*) slightly larger than the stable or house fly that deposits larvae on the skin of minks in the spring and early summer. The larvae are small and difficult to detect even in the short fur of the mink. They penetrate the skin and then grow rapidly into large grubs that cause discomfort and cries of distress in young minks. The opening is a tiny hole one-eighth to one-sixteenth of an inch in diameter and around it is moist, matted fur. The grub can be removed with narrow forceps. The cavity must be searched, for after removal it may be found to contain more than one grub. Argyrol or hydrogen peroxide is injected into the cavity.

There is no satisfactory repellent for this fly. Screening is the best preventive. [*J. E. Shillinger. Grubs in Mink. American Fur Farmer, xiii (Nov. 1940), p. 50.*]

Oat-Hull Fiber Prevents Cannibalism in Chickens

Oat-hull fiber obtained by dilute acid digestion fed to provide 11 per cent of the ration controls cannibalism and improves the development of feathers. Neither oat-hull ash nor the dilute acid extract has the same effect. [*G. E. Brearse, V. L. Miller, and C. F. McClary. The Cannibalism Preventing Properties of the Fiber Fraction of Oat Hulls. Poultry Science, xix (1940), pp. 210-215.*]

Ascorbic Acid in Acute Infections

Without knowing the mode of action, notable results are reported from the administration of vitamin C in such acute infections as diphtheria, typhoid fever and pneumonia. In moderately severe typhoid, the juice of two or three lemons daily and 50 to 100 mg. of ascorbic acid three times a day, and 300 mg. in the severe form, almost completely prevented intestinal hemorrhages. In lobar pneumonia of children, 300 mg. was given twice daily, intravenously. In an investigation of three years, the death rate in these three diseases was greatly reduced. [*F. Szirmai.*

Value of Vitamin C in the Treatment of Acute Infectious Diseases. Deut. Archiv. f. klin. Med., cxxxv (Jan. 16, 1940), p. 434. Abst., J.A.M.A. (June 1, 1940).]

Riboflavin Deficiency in Dogs

Dogs fed upon a diet containing no riboflavin develop an acute characteristic syndrome in six to eight weeks. A ration of purified casein, sucrose, cod liver oil and salt was found to be an adequate ration when supplemented with thiamin chloride; nicotinic acid, vitamin B_6, riboflavin-free liver extract and riboflavin was found to be a growing ration, but when the riboflavin was omitted, the deficiency syndrome developed. The early administration of riboflavin in the same ration was markedly curative. [*A. E. Axelrod, M. A. Lipton, and C. A. Elvehjem. The Production of Uncomplicated Riboflavin Deficiency in Dogs. Journal of Physiology, cxxviii (1940), pp. 703-708. Abst., E. S. R., lxxxiii (Oct. 1940), p. 531.*]

Ovine Tuberculosis

Tuberculosis is rare in sheep and most of the cases found are of avian origin. A case due to the bovine type of the tubercle bacillus is briefly described by E. L. Stubbs. The organism recovered was found to be pathogenic for chickens, which is not a common occurrence. [*E. L. Stubbs. Tuberculosis in Sheep. Journal of Bacteriology, xxxix (1940), p. 339. Abst., E. S. R., lxxxiii (Oct. 1940), p. 544.*]

Vitamin C Deficiency Not the Unique Cause of Scurvy

A human adult experimentally depleted of vitamin C but not of the other vitamins over a period of four months developed no symptoms of scurvy. A wound made experimentally, after the plasma readings for vitamin C were zero, showed good healing both grossly and microscopically when a biopsy was made, and the muscle tissues examined showed no trace of ascorbic acid. Transient fall in hemoglobin, basal metabolic rate and body weight occurred, however. The conclusion drawn is that in the absence of multiple avitaminosis, a low ascorbic acid level is not necessarily dangerous. [*J. H. Crandon and C. C. Lund. Vitamin C Deficiency in an Otherwise Normal Adult. New England Medical Journal, ccxxii (May 2, 1940), p. 748. Abst., J.A.M.A., cxiv (June 28, 1940), p. 2596.*]

Sheep Synthesize Nicotinic Acid

Apparently, sheep synthesize nicotinic acid. Lambs fed a nicotinic acid-deficient ration for eight months still contained a significant amount of that substance in the urine. The quantity was the same as in lambs that received a diet supplemented with nicotinic acid. [*A. H. Winegar, P. B. Pearson, and H. Schmidt. The Synthesis of Nicotinic Acid in Sheep. Abst., E. S. R., lxxxiii (Oct. 1940), p. 532.*]

BOOK NOTICES

The Virus: Life's Enemy

The book opens with a frontispiece of Edward Jenner (1749-1823) of smallpox-vaccination fame whose work seems to have given birth to the use of the word "virus" as a medical term.

The theory of *contagium animatum* did not begin with Jenner, Pasteur, Koch, Lister and their contemporary workers in the field of medical research, but with the microscopists of the 17th century who detected the presence of tiny bodies in the blood and secretions of the sick with crude lenses. Athanasuis Kircher, Italian Jesuit, fathered the germ theory of disease in the early 1600s. He discovered "worms" in the blood of plague patients, and about this time Robert Doyle of Ireland pointed out in an essay the relationship between the phenomena of fermentation and fevers, obviously impressed with the microscopy of Anton van Leeuwenhock, whose fame is inseparably associated with the history of invisible life through having developed magnification up to 300 diameters by the art

of grinding lenses. One could go back as far as Aristotle, whose philosophy drew a narrow line between living and non-living matter even as the Stanley's, and Laidlaw's and Green's and Rivers' are doing today. In short, what the microscopists of later years discovered on the causation of disease was built on the groundwork of these pioneers.

Jenner's discovery of smallpox vaccination was not an accident of empirical medicine, for he wrote that viruses are generated in the body and, when generated, perpetuate by contact. This was certainly the first real rung of the ladder that now leads to our conception of virus diseases and, most certainly, the beginning of scientific use of modified viruses in preventive medicine.

The author pays tribute to Chamberlain of the Pasteur laboratory (1877) for devising the porcelain filter (still bearing his name) which distinguishes microscopic from ultramicroscopic organisms. The Berkefeld filter of the bacteriologist was named for the owner of a mine—the mine where Nordtmeyer (1891) discovered the remarkable filtering capabilities of infusorial earth.

Ivanovski, Russian botanist (1892), by means of these filters discovered that a filtrate of tobacco leaves affected with mosaic disease, although free of figured bacteria, would cause the disease when rubbed upon normal tobacco leaves. This research brought the first proof of the existence of a virus (ultramicroscopic) disease, and is the starting point of the present knowledge of the group of virus infections of plant and animal life.

The tremendous suffering and loss of life before Jennerian vaccination exemplify the potentiality of virus diseases (yellow fever, infantile paralysis, measles, influenza, psittacosis, trench fever, etc., etc.). Moreover, there are more than 135 virus diseases of plants, not to mention the group affecting domestic animals (foot-and-mouth disease, hog cholera, dog distemper, fowl plague, the variolas, *et al).* The very names of these diseases show the enormity of the subject scientific investigation is now clarifying.

Determining the dimensions of viruses by means of improved filters, photography, roentgenography, magnetism, centrifugation, etc., startles the microscopist unaccustomed to magnifications of 20,000. Stanley's "diagram of sizes" is reproduced. It shows relative dimensions from erythrocytes down to the incomprehensible smallness of the egg albumin molecule. Stanley's chemical theory of the nature of viruses is seriously entertained, notwithstanding its controversial status. The theory that viruses are living organisms that have lost structure and function and therefore depend upon the host to furnish the material necessary for reproduction is erroneously credited to Gortner and Laidlaw.

The chapter on "How Viruses Get About" is a valuable lesson in preventive medicine, although much remains to be learned in this respect. Contact and insect carriers fail to explain every sudden outbreak of sweeping virus disease in plants and animals.

Whether inclusion bodies are aggregations of virus or merely the result of cell degeneration remains unknown. They, however, inflict grave damage to the invaded cells, amounting to complete destruction, and pave the way for bacterial invasion.

The author is to be complimented for emphasizing the importance of guarding against the introduction or presence of other viruses in experimental work. This accident has led to faulty conclusions.

The book ends with chapters on "Important Virus Diseases" and the "Prevention and Control of Virus Diseases." Here, well-told historical facts and modern methods are briefly related. But, strangely, in the many references to canine distemper as a typical virus disease and the present method of prophylaxis, no mention is made of the work of Carré. The closing page contains a list of virus diseases in man, plants and the various animals which is not complete enough to be used as a reference. Otherwise, the book covers the

broad subject in a delightful manner without notable neglect. It lays down a good foundation for a better understanding of an important group of diseases in medicine and phytopathology. [*The Virus: Life's Enemy. By Kenneth M. Smith, F.R.S. The Macmillan Company, New York, 1940. 180 pages. Illustrated. $2.00.*]

Aids to Goatkeeping

This booklet is the latest treatise published for laymen on the subject of caprine husbandry—husbandry of the milking breeds, of course. The common breeds of milking goats are named and briefly described. The text tells how to purchase, breed, feed, manage and care for this genus of domestic animals.

The chapter on "Ailments" is the habitual trek into the field of veterinary medicine for popular edification on the misfortunes that overtake gregarious animals. It is always a pity to spoil a good book on animal husbandry through the author's leaving familiar ground to make recommendations on medical science. Few authors escape stubbing their toes by the distraction, careful as they may be in having their recommendations checked. Laymen are unconsciously deceived and professional men disappointed when told, for example, that baking soda will dissolve urinary calculi "in time," or that verminous bronchitis yields to intratracheal injections of turpentine, carbolic acid and chloroform. Another example of "toe stubbing" is the recommendation to use "10 drops of nux vomica" for post-abortion weakness.

Not suspecting that nux vomica is a hard bean, the goat owner's prescription would puzzle the druggist. Actinomycosis, "spreads through the system," and the "lumps may appear over the entire body," is the author's conception of this manifestly local infection when it attacks goats. This chapter does an injustice to an otherwise good book. [*Aids to Goatkeeping. Third edition. By Carl A. Leach, editor of Dairy Goat Journal. Paper. 104 pages. Illustrated. Price not given. Dairy Goat Journal, Fairbury, Neb., 1940.*]

Principles and Practice of Bacteriology

An interesting booklet bearing this name was read with considerable delight because it presents the theory and practice of bacteriology in a concise form and arrangement that enables the author to cover a great deal of ground in limited space. As a student's manual for quick reference, there is little room for improvement and, besides, the five appendices in "reading up" for an examination will be appreciated in preparing for state board examinations. While starting the story of bacteriology with the fossil remains of 33 million years ago is stretching a point, it is none the less interesting to be reminded that microörganisms did leave a trace of their existence far beyond the beginning of recorded history.

The quick reference table to standard text books brings a lot of bibliography on two pages. There is, however, a list of references added to each chapter.

The book is divided into two parts: "The Principles of Bacteriology" and "Medical Bacteriology." Agricultural and industrial bacteriology, milk bacteriology and veterinary bacteriology are included in the first part. Medical bacteriology is reserved exclusively for the microbian life pathogenic for man.

The long list of acknowledgments in the preface certainly indicates that few bacteriologists of this hour were not consulted in the writing of this small book. [*Principles and Practice of Bacteriology. By Major Arthur H. Bryan, M.A., V.M.D., F.A.P.H.A., Science Department, Baltimore City College, and Charles G. Bryan, M.D., M.R.C.S., F.R.C.S., Royal Army Medical Corps, Porth Hospital, England. Paper. 310 pages. Illustrated. 18 color plates. Barnes & Noble, Inc., New York, 1940. $1.25.*]

The early settlers of North America used dogwood bark to cure malaria in the same manner as the Incas centuries before used choncona bark for the same purpose in South America. Dogwood contains a substance comparable to quinine.

Directory of Students Enrolled in Recognized Veterinary Colleges of North America

(Address Where Listed Is Home Residence)

Alabama Polytechnic Institute

First Year

Adams, C. E. R., Kensington Md.
Adams, C. P., Camilla, Ga.
Bass, Ernest H., Wilson, N. Car.
Boyd, Perry M., Miami, Fla.
Brinkman, Ben A., Live Oak, Fla.
Brooks, Billie, Enterprise, Ala.
Browne, Robert D., Johnston, S. Car.
Brown, James E., Rich Square, N. Car.
Burriss, W. McMurtrey, Anderson, S. Car.
Caplinger, William O., Frankfort, Ky.
Cohen, Norman, Buffalo, N. Y.
Conner, Robert F., Jasper, Ala.
Cowart, Ray R., Donalsonville, Ga.
Cunningham, W. W., St. Petersburg, Fla.
Davis, Charles S., Orlando, Fla.
Dixon, J. T., Thomasville, Ga.
Gafford, R. B., Montgomery, Ala.
George, Charles D., Birmingham, Ala.
Harmon, C. C., Floyd, Va.
Harris, J. R., Tifton, Ga.
Hayles, M. L., Frisco City, Ala.
Head, Thomas E., Jr., Andalusia, Ala.
Henderson, F. E., Mountain Creek, Ala.
Hill, Charles P., Williamson, Ga.
Hill, Robert S., Atmore, Ala.
Hillhouse, Harry L., Birmingham, Ala.
Hinds, J. J., Jr., Arab, Ala.
Hoddy, L. J., Louisville, Ky.
Hovey, Hughlon, Louisville, Ala.
Hunter, O. F., Auburn, Ala.
Jolly, Boyce M., Ayden, N. Car.
Justo, J. C., Birmingham, Ala.
Kronfeld, B. T., Herndon, Va.
Lang, C. V., Carrollton, Ala.
Levy, Morris, New York, N. Y.
Lynn, B. S., Montgomery, Ala.
McCrory, J. A., Greenville, Ala.
McFerrin, R. E., Greenville, Ala.
McKee, Harold L., Hialeah, Fla.
Martin, J. A., Emmitsburg, Md.
Matthews, Olyn, Montgomery, Ala.
Mitchell, R. W., Lineville, Ala.
Morrill, F. P., New Orleans, La.
Nall, J. D., Georgiana, Ala.
Pass, W. E., Blountsville, Ala.
Pickard, W. R., Tifton, Ga.
Porch, Louie, Auburn, Ala.
Prickett, Cavett O., Auburn, Ala.
Randall, F. C., Jr., Lyons, Ga.
Reed, E. L., Jr., Pensacola, Fla.
Reeder, M. F., Miami, Fla.
Reisinger, R. C., Miami, Fla.
Scoville, Sheldon H., Nutley, N. J.
Skinner, E. T., Littleton, N. Car.
Sledge, Joe L., Greensboro, Ala.
Smith, J. S., Whiteville, N. Car.
Sterrett, R. H., Homewood, Ala.
Weir, H. T., Jr., Media, Pa
Woodley, Charles H., Montgomery, Ala.

Second Year

Anderson, John E., Delray Beach, Fla.
Bailey, Wilford S., Auburn, Ala.
Baucom, Robert E., Marshville, N. Car.
Beaty, Robert W., Sumter, S. Car.
Blalock, Avery L., Nicholls, Ga.
Bowen, Samuel R., Jr., Tifton, Ga.
Boyd, Carl Ellis, Raleigh, N. Car.
Burns, Thomas H., Birmingham, Ala.
Burnside, Halbert O., Birmingham, Ala.
Bush, Thomas C., Cordele, Ga.
Case, Francis H., Savannah, Ga.
Clanton, James R., Quitman, Ga.
Cochran, W. B., Pauls Valley, Okla.
Coffee, George D., Decatur, Ga.
Connor, Nolen D., Auburn, Ala.
Coppage, D. R., Vanceboro, N. Car.
Crane, Joe B., Dixie, Ga.
Croft, Deward B., Crossville, Ala.
Dawsey, Benjamin W., Aynor, S. Car.
Dean, Gilbert F., Somerville, Ala.
Douglas, A. Bruce, Birmingham, Ala.
Dowd, John G., Pauls Valley, Okla.
Edminston, H. M., Easton, Md.
Ennis, Luther M., Salem, Ala.
Fancher, James M., Wilton, Ala.
Flynn, Billie U., Birmingham, Ala.
Fichandler, Phillip D., New Haven, Conn.
Franklin, Ira I., Camden, N. J.
Garwood, Sam H., Sumter, S. Car.
Giltner, Bernard L., Washington, D. C.
Glazener, Waltner W., Brevard, N. Car.
Hale, Clyde F., Morristown, Tenn.
Hall, Hoyt C., Pinellas, Fla.
Harrell, Wilson H., Enterprise, Ala.
Hayden, Arthur F., Dedbam, Mass.
Hayes, Thomas A., Thornsby, Ala.
Hicks, Warren H., Rocky Mount, N. Car.
Howard, Jack H., Leesburg, Va.
Hughes, C. P., Evington, Va.
Irby, Leonidas E., Eufaula, Ala.
Irvin, Willis H., Dahlonega, Ga.
Isbell, W. J., Auburn, Ala.
Jacobs, Joel H., Moulton, Ala.
Jordan, Edward M., Allen, Ala.
Kaminis, Clinton N., Tarpon Spring, Fla.
Kennedy, B. W., Boca Grande, Fla.
Lee, Robert E., Brewton, Ala.
Lindsey, W. L., Galox, Va.
London, Jack, Goodwater, Ala.
Milhollin, W. Ray, Broxton, Ga.
Moore, W. L., Roba, Ala.
Morgan, H. H., Cunningham, Tenn.
Nettles, W. D., Auburn, Ala.
Nowlin, Charles L., Pensacola, Fla.
Pittman, C. W., Lyons, Ga.
Pope, Eugene J., Newsome, Va.
Putney, W. W., Farmville, Va.
Quilty, M. A., Jr., Lake Charles, La.
Riddle, John T., Piedmont, S. Car.
Spence, William E., Smyrna, Del.
Stafford, A. L., Plant City, Fla.
Stearns, Joseph T., Louisville, Ky.
Swearingen, Charles R., Trenton, S. Car.
Thorp, Wilton S., Auburn, Ala.
Thrasher, John P., Jr., Quitman, Ga.
Turner, Albert U., Phenix City, Ala.
Weissinger, William W., Browns, Ala.
Whitney, George D., Orange, Conn.
Williams, Josiah M., Monk's Corner, S. Car.
Yarbrough, Cecil S., Jr., Auburn, Ala.
Young, Leonard E., Columbia, S. Car.
Young, Lester B., Johnson City, Tenn.

Third Year

Andrews, James F., Florala, Ala.
Ashwander, Ray A., Hanceville, Ala.

Becker, Louis, Jacksonville, Fla.
Bodine, Ardell H., Arab, Ala.
Bomar, Marion P., Paris, Tenn.
Bowen, Leroy E., Jr., Lynchburg, Va.
Brewer, Walter E., Moulton, Ala.
Brown, Heywood G., Springfield, S. Car.
Cloyd, Grover D., Florence, Ala.
Crawford, M. L., Marion, Ala.
Culpepper, Thomas P., Jr., Cullman, Ala.
Davis, Joseph M., Albertville, Ala.
Deal, Thomas C., Conover, N. Car.
Dimmerling, D. S., Elrod, Ala.
Dobbs, William R., Loachapoka, Ala.
Eason, George E., Hartselle, Ala.
Ellis, L. C., Florence, Ala.
Gates, Silas B., Ardmore, Ala.
Gilchrist, Grady Lee, Clayton, Ala.
Gross, Clifford L., Auburn, Ala.
Harding, John W., Harding's Northumberland, Va.
Hardwick, George C., Decatur, Ala.
Hathaway, Lynn W., Oneonta, N. Y.
Hazelrig, John W., Sycamore, Ala.
Jackson, H. C., Ivanhoe, Va.
James, Edmund H., Waverly, Ala.
Jerome, Q. R., Wilson, Ark.
Jones, Preston B., Starr, S. Car.
Jones, Henry J., Citronelle, Ala.
Johns, James L., Montgomery, Ala.
Kallman, Daniel E., New York, N. Y.
Kellett, Samuel J., Jr., Greenville, S. Car.
Knowles, Albert D., Jr., West Palm Beach, Fla.
Lanham, T. E., Edgefield, S. Car.
Mackery, Earl R., Jacksonville, Fla.
Madill, James W., Dade City, Fla.
Monk, Timothy A., Goldsboro, N. Car.
Moore, George E. H., Walterboro, S. Car.
Meadows, J. C., Salem, Ala.
Meadows, M. E., Jr., Phenix City, Ala.
Nelson, Hoyt, Red Bay, Ala.
Rackley, R. C., Pelham, Ga.
Rackley, V. E., Pelham, Ga.
Robey, Thomas O., Silver Springs, Md.
Rogoff, George, Wilmington, Calif.
Sawyer, Thomas B., Frisco City, Ala.
Slaughter, Thomas S., Brooklandville, Md.
Stone, Price Moss, Hurtsboro, Ala.
Sutton, Thomas B., Sylvester, Ga.
Thompson, Leslie G., Swainsboro, Ga.
Thornton, Grover C., Union Springs, Ala.
Waters, J. M., Manassas, Va.
Whittington, Kenneth, Midway, Ala.
Williams, H. R., Winfield, Ala.

Fourth Year

Avery, Marion R., Red Bay, Ala.
Bassham, Hugh A., Bethel Springs, Tenn.
Bateman, Joseph C., Columbia, N. Car.
Berry, Sidney A., Vina, Ala.
Birn, Martin, Washington, D. C.
Blunschi, Jon, Jr., Boligee, Ala.
Boyette, Edward F., Selma, N. Car.
Brown, Thomas E., Spartanburg, S. Car.
Clanton, George H., Quitman, Ga.
Dickinson, Robert A., Montgomery, Ala.
Dickinson, Robert L., Bishopville, S. Car.
Edwards, Bennie S., Mobile, Ala.
Evans, Calvin W., Naruna, Va.
Evans, John W., Jr., Naruna, Va.
Faughn, James A., Benton, Ky.
Ferrell, Edwin H., Opelika, Ala.
Givens, Craig B., Richmond, Va.
Haire, W. C., Quincy, Fla.
Hare, Hobart, Wilmington, Del.
Haworth, Sylvan D., Okeene, Okla.
Jerome, Newell G., Wilson, Ark.
Jordan, Warren A., Jr., Laurinburg, N. Car.
Kinsey, Bill H., Peekskin, N. Y.
Lewallen, George L., St. Petersburg, Fla.
Long, William M., Burlington, N. Car.
Lovvorn, Raymond D., Woodland, Ala.
MacEachern, Gordan, Haverhill, Mass.
McDaniel, George T., Eastman, Ga.
McKee, John W., Selma, Ala.
Matthis, Merwin H., New Berne, N. Car.
Mead, Howard N., Greensboro, N. Car.
Melton, George A., Atmore, Ala.
Moore, John J., Marion Junction, Ala.
Moorman, Guy W., Douglas, Ga.
Parker, H. F., Brewton, Ala.
Petty, W. V., Dawson, Ga.
Phillips, Charles R., Phil Campbell, Ala.
Piggott, John B., Purcellville, Va.
Porter, Lyman E., Quincy, Fla.
Sause, Milton P., Baltimore, Md.
Schell, Fred G., Union Springs, Ala.
Smith, George K., Columbia, S. Car.
Spears, Cecile J., Dublin, Ga.
Sprinkle, David G., Washington, D. C.
Stith, Julian D., Mullins, S. Car.
Strock, Otto M., Elloree, S. Car.
Warren, Frederick F., Middleburg, Va.
Wells, Vernon Leo, Selma, Ala.
Whitman, James P., Jr., Winfield, Ala.
Wiatt, Alexander T., Hampton, Va.
Willis, J. W., New Rockford, N. Dak.
Young, Henry G., Lyerly, Ala.
Thompson, William M., Camden, Ala.

Colorado State College

First Year

Adams, Charles R, Reno, Nev.
Barngrover, Walter J., Hugo, Colo.
Boice, Grant, La Jara, Colo.
Brandt, Joe, Bridgeport, Neb.
Buchtel, John R., Denver, Colo.
Clark, Sterling D., Fowler, Colo.
Cullen, Wm. Clough, Mankato, Minn.
Eberle, Richard C., Silex, Mo.
English, James E., Martinsburg, Mo.
Green, William S., Fort Collins, Colo.
Hadley, J. Milton, Visalia, Calif.
Halley, Thomas H., Fort Collins, Colo.
Hamilton, Paul C., Stillwater, Okla.
Hasselbalch, Neal I., St. Edward, Neb.
Hastings, George H., La Porte, Ind.
Hoerlein, B. Franklin, Fort Collins, Colo.
Hunter, Elmer C., Snow Mass, Colo.
Jobe, Darr, Visalia, Calif.
Kennedy, Thomas J., Creston, Neb.
Klaich, Nick, Fort Collins, Colo.
Koenig, Richard E., Sterling, Colo.
Laird, William W., Bell, Calif.
Leadbetter, Lynn, Eaton, Colo.
McChesney, Arthur C., Trinidad, Colo.
McChesney, John H., Trinidad, Colo.
McNamara, James H., Brighton, Colo.
Miller, S. Glen, Fort Lupton, Colo.
Minnick, Richard F., Greeley, Colo.
Molello, Joseph, Portland, Colo.
Nealon, William J., Denver, Colo.
Nisley, Bryant B., Gothenburg, Neb.
Osguthorpe, Delbert, Salt Lake City, Utah
Pike, Tommy, La Junta, Colo.
Reid, Donald G., Fort Morgan, Colo.
Schroeder, Robert J., Fort Collins, Colo.
Stacy, Joseph E., Walsenburg, Colo.
Stein, J. Arnold, Fort Collins, Colo.
Summers, Mark, Grand Lake, Colo.
Tew, Alfred C., Fort Collins, Colo.
Vader, Paul, Gunnison, Colo.
White, Robert W., Walthill, Neb.
Wion, John E., Fort Collins, Colo.
Woods, Richard S., Monte Vista, Colo.

Second Year

Adami, Robert W., San Fernando, Calif.
Ausherman, Robert J., Miami, N. Mex.

Barber, Sterling E., Exeter, Neb.
Barnhart, Walter G., Shaw, Colo.
Bean, John H., Littleton, Colo.
Beggs, William E., Lamar, Colo.
Bouton, Garret N., Aurora, Colo.
Buxton, Robert A., Fort Morgan, Colo.
Cooper, Emanuel S., Los Angeles, Calif.
Costa, Anthony J., Trinidad, Colo.
Eden, Edward L., Pueblo, Colo.
Epling, Glenn P., Fort Collins, Colo.
Foster, William M., Fort Collins, Colo.
Gillispie, J. Marvin, Fort Collins, Colo.
Henry, Jerrold N., San Leandro, Calif.
Hittle, Harold E., Hartman, Colo.
Kiefer, Ural K., Fort Collins, Colo.
Langridge, John R., Fort Collins, Colo.
Lanphear, Paul R., Fort Collins, Colo.
Leadbetter, Wayne A., Eaton, Colo.
Lumley, Charles S., Grand Junction, Colo.
McCain, Laurence P., Omaha, Neb.
McElyea, Ulysses, Las Cruces, N. Mex.
Marcus, Melvin J., Los Angeles, Calif.
Nicholes, Max M., Provo, Utah
Ramsay, Larry, Rawlins, Wyo.
Richards, Robert R., Denver, Colo.
Riggs, Charles W., Fort Collins, Colo.
Taylor, Howard C., Hillrose, Colo.
Vincent, Howard R., Denver, Colo.
Von Tour, Elisha, Denver, Colo.
Watson, George R., Estes Park, Colo.
Webb, Jack Howard, Loveland, Colo.
Westfall, Ralph D., Jr., Colusa, Calif.
Williams, Robert R., Livermore, Colo.
Wilson, John A., Fort Collins, Colo.
Zontine, William J., Denver, Colo.

Third Year

Baird, Bert W., Glenwood Springs, Colo.
Batista, Albert, Portland, Colo.
Bauman, Vernon R., Gothenburg, Neb.
Bohlender, Isaac, La Salle, Colo.
Bolton, Kenneth V., Brighton, Colo.
Brown, James R., Chicago, Ill.
Bunnell, Orval E., Hereford, Colo.
Burkhardt, Stewart, Brighton, Colo.
Camner, Murray H., Greenwich, Conn.
Clark, Clarence C., Denver, Colo.
Collinson, Ralph L., Fort Collins, Colo.
Crawford, Robert N., Denver, Colo.
Dale, Joseph E., Fort Collins, Colo.
Deniels, George N., Denver, Colo.
Eatinger, Eugene E., Denver, Colo.
Foster, Ralph A., Fort Collins, Colo.
Green, William W., Trinidad, Colo.
Hargreaves, Richard E., Sterling, Colo.
Harrison, John Wm., Denver, Colo.
Howarth, William A., Denver, Colo.
Hutchinson, Mort D., Fowler, Colo.
Jackson, Delwyn A., Manassa, Colo.
Jensen, Rue, Fort Collins, Colo.
Kennedy, Orville A., Fort Collins, Colo.
Kerns, Robert L., Fort Collins, Colo.
La Bore, Don E., Fowler, Colo.
Lambert, Carl T., Fort Collins, Colo.
Mackey, Donald R., La Salle, Colo.
Moore, Tom R., Denver, Colo.
Nordell, Harold L., Idaho Falls, Idaho
Norris, James V., Sugar City, Colo.
Peavy, Leonard S., Fort Collins, Colo.
Richards, Glenn N., Julesburg, Colo.
Roach, LaVerne M., Fort Collins, Colo.
Schroeder, Gerald F., Carr, Colo.
Skold, Bernard H., Haxtun, Colo.
Smylie, James M., Virginia Dale, Colo.
Spratlin, Edward W., Littleton, Colo.
Stauffer, Vyrle D., Fort Collins, Colo.
Unfer, Richard J., Denver, Colo.
Watts, Raymond E., Fort Collins, Colo.
Weller, Walter W., Fort Collins, Colo.
Witcosky, Leonard C., San Luis Obispo, Calif.

Fourth Year

Ackerman, Leon F., Boulder, Colo.
Beach, Melvin K., Delta, Colo.
Beasley, John V., Pueblo, Colo.
Bennett, John T., Chicago, Ill.
Bishop, Vincil C., Sheridan, Wyo.
Blake, Walter P., Greeley, Colo.
Bolton, Glen S., Brighton, Colo.
Brisnehan, Edmund R., Denver, Colo.
Candlin, Paul T., Olava, Colo.
Christensen, James M., Fort Collins, Colo.
Cummings, Fred C., Fort Collins, Colo.
Dakin, William V., Los Angeles, Calif.
Ferrell, Luman G., Fort Collins, Colo.
Fletcher, Jack C., Torrington, Wyo.
Furgeon, Harry E., Pueblo, Colo.
Gilbert, Gail H., Arvada, Colo.
Heisel, Allen M., Cascade, Colo.
Hird, Joseph J., Denver, Colo.
Matlock, Cecil J., Fort Collins, Colo.
Merrick, Boyd B., Fort Collins, Colo.
Mikkelson, Clayton E., Fort Collins, Colo.
Milbradt, Duane L., Fort Collins, Colo.
Newton, Harold F., Sugar City, Colo.
Phillips, Lee R., Lakewood, Colo.
Pitcher, Jack R., Fort Collins, Colo.
Ramsay, Donald D., Haxtun, Colo.
Sorensen, Harris, Fort Collins, Colo.
Stansbury, W. M., Jr., Fort Collins, Colo.
Swanson, Loren J., Fort Collins, Colo.
Tarr, Lewis M., Fort Collins, Colo.
Thornburg, Dail L., Pueblo, Colo.
Tornow, Winston H., Denver, Colo.
Vagneur, James D., Woody Creek, Colo.
Vidal, Lewis L., Rifle, Colo.
Young, Clyde W., Fort Collins, Colo.

Cornell University

First Year

Arnaboldi, J. P., Mt. Sinai, N. Y.
Bandes, G. H., New York, N. Y.
Beakman, L. M., Lockport, N. Y.
Berdan, L. N., Salem, N. Y.
Boardman, Don A., Jr., Rome, N. Y.
Bradley, Miss D. E., Lockport, N. Y.
Coye, E. N., Naples, N. Y.
Crawford, E. J., Angelica, N. Y.
Doig, R. S., Walton, N. Y.
Dragoo, P. O., Schenevus, N. Y.
Elmer, E. K., Malone, N. Y.
Ferber, Leonard, Flushing, N. Y.
Fish, R. B., Canisteo, N. Y.
Gage, T. A., Kinderhook, N. Y.
Gillespie, R. J., Brooklyn, N. Y.
Goldberg, Abie, Hudson, N. Y.
Goodman, Merrill, Livingston Manor, N. Y.
Goss, Allen C., Stamford, N. Y.
Grover, B. A., Plattsburg, N. Y.
Jastremski, M. M., Richfield Springs, N. Y.
Jones, W. G., Smithtown Branch, N. Y.
Karmin, L. R., New York, N. Y.
Kieth, Miss F. E., Greenlawn, N. Y.
Palmer, H. R., Yorktown Heights, N. Y.
Parmelee, R. H., Jr., Geneva, N. Y.
Radziwiller, Saul, Brooklyn, N. Y.
Rickard, C. G., Ithaca, N. Y.
Ripps, J. H., Flushing, N. Y.
Malmberg, R. A., Ashville, N. Y.
O'Dea, J. C., Gardiner, N. Y.
Robertson, C. M., Tuckahoe, N. Y.
Schaer, W. G., Hollis, L. I.
Simpson, C. F., East Orange, N. J.
Smith, E. B., Gainesville, N. Y.
Studdert, H. P., Philipsburg, Mont.
Tanis, John, Augusta, N. J.
Troyansky, Matthew, Brooklyn, N. Y.
Tweddle, J. R., Montgomery, N. Y.
Vail, J. I., Bristol, Conn.

Viele, W. I., Glens Falls, N. Y.
Whitehead, R. G., Monroe, N. Y.
Young, W. N., Staten Island, N. Y.
Zepp, Clarence P., Jr., New York, N. Y.

Second Year

Adolph, W. H., Jr., Peking, China
Arnaboldi, A. C., Mt. Sinai, N. Y.
Becker, M. E., Altamont, N. Y.
Brungot, N. S., Berlin, N. H.
Burghardt, H. F., Douglaston, N. Y.
Cleveland, H. J., Cattaraugus, N. Y.
Conklin, E. A., Richville, N. Y.
Dillman, E. G., Bellmore, N. Y.
Fisher, Bernard, Columbiaville, N. Y.
Gilbert, Edwin O., West Orange, N. Y.
Gumaer, K. I., Poughkeepsie, N. Y.
Halpin, G. D., Jamesville, N. Y.
Haner, F. H., Jr., Hensonville, N. Y.
Hokanson, J. F., Pleasantville, N. Y.
Hopper, Henry D., Ridgewood, N. J.
Huckle, J. J., Clyde, N. Y.
Jenkins, D. L., New Paltz, N. Y.
Kiesel, George K., Manhasset, N. Y.
Kotchek, Leo, Brooklyn, N. Y.
Lanfair, C. E., Warrensburg, N. Y.
Larson, L. J., Merrick, N. Y.
Lewis, N. F., Flushing, N. Y.
Lindsey, L. W., Seneca Falls, N. Y.
Lipman, Bernard, Brooklyn, N. Y.
McKown, D. C., Franklin, N. Y.
Majilton, E. A., Catskill, N. Y.
Matuszczak, W. J., Lowville, N. Y.
Moul, Miss A. L., Gloversville, N. Y.
Paddock, N. M., Bath, N. Y.
Phillips, W. V., Amenia, N. Y.
Proper, J. S., Honeoye Falls, N. Y.
Richards, J. W., Akron, N. Y.
Ruebush, E. E., Washington, D. C.
Tymchyn, V. J., Altamont, N. Y.
Ulrich, C. L., Buffalo, N. Y.
Woolfe, Daniel, Brooklyn, N. Y.
Young, G. A., Jr., Ithaca, N. Y.
Zimmerman, T., New York, N. Y.

Third Year

Armstrong, James, Fullers, N. Y.
Baxter, C. M., Union, N. Y.
Blostein, L. I., Ithaca, N. Y.
Comin, Ralph, Richmond Hill, N. Y.
Fraser, Gordon S., Chazy, N. Y.
Gilmour, J. T., Mt. Vernon, N. Y.
Haller, C. J., Ithaca, N. Y.
Handler, Paul, Brooklyn, N. Y.
Jones, A. J., Remsen, N. Y.
Kane, J. R., Johnstown, N. Y.
Kinney, Miss G. E., Auburn, N. Y.
Kopp, Harold, Woodridge, N. Y.
Lasher, H. N., Catskill, N. Y.
Leahy, Charles R., Whitney Point, N. Y.
Leveson, Lawrence, Buffalo, N. Y.
Mackerley, Miss Jean, Newton, N. J.
Martin, A. R., Clarence, N. Y.
Maschgan, Erick R., New York, N. Y.
May, R. E., Webster Crossing, N. Y.
Mick, Lester H., Peterboro, N. Y.
Morse, G. E., Marathon, N. Y.
Muskus, C. E., Venezuela, S. A.
Newton, W. I., Cohoes, N. Y.
Peterson, E. H., Firth, Idaho
Phelps, H. C., Watkins Glen, N. Y.
Proctor, D. L., Jr., Lexington, Ky.
Pulling, F. B., Jr., Lagrangeville, N. Y.
Rieber, Jesse P., New York, N. Y.
Rubenstein, A. M., Bronx, N. Y.
Sann, Benjamin, New York, N. Y.
Saunders, Richard, Clarence, N. Y.
Scheffler, H. G., Williamsville, N. Y.
Schwobel, Wilbur P., Jamaica, N. Y.
Smith, Merwin G., Albany, N. Y.
Smith, Robert D., Bristol, Vt.
Solmitz, G. S., Bryn Mawr, Pa.
Steed, Donald J., Johnson City, N. Y.
Ucko, P. W., New York, N. Y.
Vedder, C. D., Jr., Fonda, N. Y.
Wager, L. A., King Ferry, N. Y.
Weiss, Leonard, Jamaica, N. Y.
White, Howard S., Ithaca, N. Y.
Wuori, L. A., North Salem, N. Y.

Fourth Year

Ackerman, Anthony J., Astoria, N. Y.
Bendersky, Samuel, Nassau, N. Y.
Britton, John W., Oakland, Calif.
Bryan, Donald I., Washingtonville, N. Y.
Charles, A. S., Brooklyn, N. Y.
Conner, Alexander, Avoca, N. Y.
Dean, Donald J., Scotia, N. Y.
Earl, A. E., Morristown, N. J.
Everly, W. P., Manlius, N. Y.
Fales, Roger R., Derby, N. Y.
Ferris, Joseph, Ithaca, N. Y.
Fobian, V. C., Charlton, N. Y.
Guglielmino, A. J., Rochester, N. Y.
Harmon, Karl S., Ithaca, N. Y.
Heisel, Harry J., Syracuse, N. Y.
Horowitz, Nathan, Brooklyn, N. Y.
Linden, B. A., New York, N. Y.
McKinney, Geore V., Spencerport, N. Y.
Maxwell, Henry, Albany, N. Y.
Meisels, Morton, Brooklyn, N. Y.
Mick, Louis W., Peterboro, N. Y.
Milks, Richard V., Ithaca, N. Y.
Papish, Philip G., Ithaca, N. Y.
Peppe, V. J., Pine Plains, N. Y.
Polansky, Henry, New York, N. Y.
Rice, A. W., Ithaca, N. Y.
Risley, H. B., Brooklyn, N. Y.
Sheridan, Gerald, Cortland, N. Y.
Simmons, E. W., Scituate, Mass.
Siver, D. H., Watertown, N. Y.
Snyder, L. D., Cortland, N. Y.
Spanier, S. E., Brooklyn, N. Y.
Steinfeldt, E. F., Rochester, N. Y.
Sylstra, A. W., Guilford, N. Y.
Tucker, E. W., Port Jervis, N. Y.
Udall, Robert H., Ithaca, N. Y.
Woodruff, R. A., Albion, N. Y.
Wright, F. O., Rhinebeck, N. Y.

Iowa State College

First Year

Albrecht, Joseph W., Tiskilwa, Ill.
Allison, Archie, State Center, Iowa
Anderson, Stilaf, Holt, Minn.
Baker, Durwood L., Algona, Iowa
Barrington, James A., Alexis, Ill.
Beer, William L., Roanoke, Ill.
Benbrook, Stanley, Ames, Iowa
Bicek, Ernest K., Tracy, Minn.
Blair, Alvin E., Irwin, Iowa
Bowstead, Tom T., De Witt, Iowa
Carr, William K., Tulsa, Okla.
Diercks, Clinton C., Mason City, Iowa
Dunnwald, John H., St. Paul, Minn.
Eninger, Robert A., Spencer, Iowa
Espensen, Lawrence L., West Branch, Iowa
Finch, Robert W., Kelley, Iowa
Flanary, James B., St. Charles, Minn.
Foley, Edward J., Cottonwood, Minn.
Fruit, David J., Waukesha, Wis.
Gray, Burton J., Whitten, Iowa
Griswold, David M., Winterset, Iowa
Harry, Max W., Adair, Iowa
Hollen, Robert M., Winterset, Iowa

Hoyt, Robert H., Deer Creek, Minn.
Humke, Laurence W., Ackley, Iowa
Idsvoog, Oris P., Cooperstown, N. Dak.
Isakson, Eric W., Ogden, Utah
Jackson, Gilbert S., Altadena, Calif.
Janson, Eldon J., Clarion, Iowa
Jones, Jack M., Ames, Iowa
Kanegis, Leon A., Ames, Iowa
Kjar, Harold A., Lexington, Neb.
Kopp, Wendell J., Indianola, Iowa
Ladwig, Vaylord D., Ames, Iowa
Lane, James D., Oklahoma City, Okla.
Lynch, William M., Fort Dodge, Iowa
Miller, Jeffrey J., Fayette, Iowa
Moore, Maurice W., Batavia, Ill.
Olson, Arnold T., Sioux Rapids, Iowa
Olson, Gustaf J., Cloquet, Minn.
Palmer, Leo R., West Chester, Iowa
Peterson, Philip C., Aurelia, Iowa
Pierson, Robert E., San Francisco, Calif.
Pratt, Donald W., Red Oak, Iowa
Preusser, Karl R., Ames, Iowa
Reinertson, Kenneth L., Kelley, Iowa
Rohwer, Harold H., Ames, Iowa
Ruebke, Henry J., Ada, Minn.
Schneider, Robert F., Elgin, Iowa
Schuknecht, Robert M., Port Washington, Wis.
Stanton, Harlan M., Park Ridge, Ill.
Stillinger, Clark J., Red Oak, Iowa
Stoenner, Herbert G., Sibley, Mo.
Sullivan, Edward T., Des Moines, Iowa
Sutherland, Thomas A., Ames, Iowa
Thompson, Judson A., Stonden, Minn.
Thompson, Wayne H., Earlville, Iowa
Thornton, James W., Ankeny, Iowa
Ungs, David H., Dyerville, Iowa
Vegors, Mason M., Webster City, Iowa
Vollmar, Warren W., Montgomery, Minn.
Wagner, Robert E., Glidden, Iowa
Ward, Norman R., Anthon, Iowa
Waters, William B., Rockwell, Iowa
Westerfeldt, Marvin H., Reedsburg, Wis.
Whitford, Russell, Darlington, Wis.
Yoder, Wayne D., Ames, Iowa

Second Year

Anderson, Garnn O., Swea City, Iowa
Banks, Robert C., Tipton, Iowa
Becker, Leo F., Bellevue, Iowa
Brager, Richard, Clear Lake, Iowa
Brown, Russell, Waterloo, Iowa
Calhoun, William H., Cooperstown, N. Dak.
Dorsey, Terrance A., Millerton, Iowa
Dykstra, Clarence F., Rock Rapids, Iowa
Fisher, Lester E., Chicago, Ill.
Fistler, Raymond P., Clear Lake, Iowa
Flickinger, Milton R., Aurora, Iowa
Gray, Dean H., Eldora, Iowa
Griebie, Keith E., Brownton, Minn.
Griffiths, Henry J., Quebec, Can.
Haight, Paul M., Winfield, Iowa
Hill, James K., Adel, Iowa
Hylton, Jack W., Los Angeles, Calif.
Irvine, Robert D., Ames, Iowa
Johanson, Lawrence V., Elmore, Minn.
Karber, Melvin W., Scranton, Iowa
Kirkpatrick, Robert J., Oakland, Minn.
Kitchell, Ralph L., Moorhead, Minn.
Klett, Wilbert M., Everly, Iowa
Loften, Robert D., Lakota, N. Dak.
Loucks, Joseph L., Cherokee, Iowa
Ludgate, Thomas B., Fort Dodge, Iowa
McIntire, John C., Maquoketa, Iowa
Mackereth, Robert D., Kimball, Minn.
Mannasmith, Clarence H., Coin, Iowa
Marsh, Herbert L., Elroy, Wis.
Melles, Leonard H., Sioux City, Iowa
Miller, W. LaVern, Jet, Okla.
Morgan, Richard B., Ames, Iowa.
Nelson, Albin J., Eagle Grove, Iowa
Nelson, Melvin R., Peterson, Iowa
Norden, Carl J., Lincoln, Neb.
O'Harra, John L., Tama, Iowa
Penkert, Richard A., New Ulm, Minn.
Pennings, Arthur W., Orange City, Iowa
Quigley, Joseph S., Minneapolis, Minn.
Rafoth, Leslie J., Dubuque, Iowa
Rawson, Donald W., Moville, Iowa
Reppert, Ray F., West Point, Neb.
Reppert, Roy E., West Point, Neb.
Rhodes, James D., Fort Dodge, Iowa
Rice, William C., Des Moines, Iowa
Rossing, Tedmar D., Bode, Iowa
Savage, Robert, Spencer, Iowa
Schweim, Erich A., Springfield, Minn.
Scott, A. Mack, Des Moines, Iowa
Skamser, Leonard M., Eau Claire, Wis.
Smith, Phillip E., Clarion, Iowa
Spaulding, Donald L., Omaha, Neb.
Stepp, Forrest A., New Madrid, Mo.
Swain, Lyle W., Garden Grove, Iowa
Thompson, Floyd W., Sioux City, Iowa
VanderGarde, Gerald C., Hull, Iowa
Wahl, Robert C., Gladbrook, Iowa
Winslade, Jack L., Shipman, Ill.
Young, Robert M., Traer, Iowa

Third Year

Burnham, Healy C., Ames, Iowa
Christensen, Earl, Walnut, Iowa
Christensen, LeRoy, Canby, Minn.
Denton, Jack, Middlebury, Vt.
Dodd, Daniel P., St. Louis, Mo.
Eittreim, Silas C., Radcliffe, Iowa
Estes, Carl E., Moulton, Iowa
Feldman, Louis W., Ames, Iowa
Field, Dale Wirt, Muscatine, Iowa
Gathmann, Arthur C., Council Bluffs, Iowa
Gentile, Frank L., Kenosha, Wis.
Gilmore, Don F., Oil Center, Ky.
Glitz, George H., Mason City, Iowa
Graham, Joseph A., Milo, Iowa
Grell, Hans A., Council Bluffs, Iowa
Hanna, H. Edward, Marion, Iowa
Held, Harold, Hinton, Iowa
Holen, Borg D., Roland, Iowa
Hoyt, Harvey H., Deer Creek, Minn.
Huso, Burnell T., Cottonwood, Minn.
Jacobs, Robert, Paullina, Iowa
Jensen, Helmer P., Fenton, Iowa
Keller, George E., Pipestone, Minn.
Kenzy, Sam G., Iona, S. Dak.
Kilpatrick, Warren J., Mediapolis, Iowa
Kruger, Gordon J., Gilmore City, Iowa
Leamer, Dwain H., Hull, Iowa
Lenz, Robert J., Ames, Iowa
Ling, Paul A., Sheldon, Iowa
Lortz, Harry P., Plainview, Neb.
McClelland, Eugene S., Alexis, Ill.
McGill, Dana, Center, Neb.
McGilvray, John H., Ames, Iowa
Marriott, John, Sioux City, Iowa
Meeusen, Clarence W., Cedar Grove, Wis.
Monlux, Andrew W., Algona, Iowa
Moore, Leslie J., Terril, Iowa
Moret, James H., Boyden, Iowa
Munson, William L., Lewistown, Ill.
Nehmer, Eugene O., Fond du Lac, Wis.
Ogden, Hobart D., Winnetka, Ill.
Olson, Alfred M., Belgrade, Minn.
Orton, Clifford T., Cherokee, Iowa
Peterson, Vernon, Chester, S. Dak.
Rasmussen, Russell E., Harlan, Iowa
Reimers, Frank H., Minden, Iowa
Ryan, Raymond J., Millville, Minn.
Sawyer, Boyd R., Eugene, Ore.
Sessions, William G., Burlington, Iowa
Sexton, Joseph W., Sumner, Iowa

Tobola, Raymond J., Ames, Iowa
Van Howeling, Donald C., Pella, Iowa
Wallinga, Merrill H., Doon, Iowa
Ward, Donald E., Anthon, Iowa
White, Darrell, Ames, Iowa
White, Joseph B., Ames, Iowa
Wilson, James W., Dodgeville, Wis.

Fourth Year

Anderson, Collins Wm., Mexico, Mo.
Arnold, John, Long Pairie, Minn.
Bacon, Dwight G., Cedar Falls, Iowa
Ball, Dale D., McCallsburg, Iowa
Bartley, Frank E., LuVerne, Iowa
Beardmore, Howard F., Missoula, Mont.
Beemer, Melvin R., Gravity, Iowa
Bradt, Raymond K., Fort Dodge, Iowa
Campbell, Robert L., Brookfield, Mo.
Carey, John W., West Liberty, Iowa
Cook, Earl L., Farmington, Minn.
Coons, Max C., Salem, Ore.
Cornwell, Gerald, Ankeny, Iowa
Cotter, Darrel, Tabor, Iowa
Deaver, John W., Beacon, Iowa
Derrer, Reynold, Lanark, Ill.
Dodds, Robert C., Lake Crystal, Minn.
Dunne, Howard W., Ames, Iowa
Eakin, Carroll E., Lake City, Iowa
Eder, E. Paul, Blue Earth, Minn.
Failing, Frank W., Winona, Minn.
Fehl, Gerald H., Sturgeon Bay, Wis.
Forland, Lawrence M., Manly, Iowa
Gaffin, Arvid H., Chicago, Ill.
Gilmore, James W., Berkeley, Calif.
Hayden, William J., Clinton, Mo.
Helvig, Raymond, Forest City, Iowa
Hertich, Charles D., Chester, Ill.
Houston, Montomery L., South Milwaukee, Wis.
Jensen, Harlan E., St. Ansgar, Iowa
Johnson, Clarence E., Belgrade, Minn.
Jones, Max W., American Fork, Utah
Kinney, Norman K., Newell, Iowa
Knoop, Francis Wm., LeMars, Iowa
Kufrin, Ruben, Gaylord, Minn.
Kurtz, Wheeler, Chicago, Ill.
Kyner, Roy E., Humeston, Iowa
Lightcap, George, Lansdale, Pa.
Lindenstruth, Robert W., Marshfield, Mo.
Linn, Samuel D., Shelby, Iowa
Llewellyn, Lew, Ames, Iowa
Loiler, Merle E., Sidney, Iowa
Magruder, Kent, Clatskanie, Ore.
Martens, Orville G., Perry, Iowa
Mickelson, Clifford, Eagle Grove, Iowa
Miner, Merthyr L., Ames, Iowa
Nelson, Quention, Sioux City, Iowa
Orum, Arthur, Carthage, Ill.
Pittman, Arthur B., Kansas City, Mo.
Ponder, Alvin E., Chester, Ill.
Price, Roy B., Effingham, Ill.
Read, Raymond D., Leeds, N. Dak.
Smith, Corwin L., Jefferson, Iowa
Sours, Calvin D., Marble Rock, Iowa
Speltz, Jerome, Rollingstone, Minn.
Stong, Jake, Waterloo, Iowa
Stowe, Richard L., Glenwood, Iowa
Tietze, Albert L., Jr., Taft, Calif.
Timms, Walter H., Lansford, N. Dak.
Waggoner, Nathaniel R., Alden, Iowa
Welch, James F., Waukesha, Wis.

Michigan State College

Aldred, John R., Jackson, Mich.
Allen, Eber H., Valparaiso, Ind.
Amsiejus, Julius W., Pelham, N. H.
Ansley, Delmar A., Danville, Ind.
Appelhof, William K., Grand Blanc, Mich.
Ascher, Margaret, New York, N. Y.
Auker, Joe A., South Whitley, Ind.
Ayres, Paul E., Detroit, Mich.
Bailey, Robert W., Trenton, Mich.
Baker, Robert N., Pleasant Ridge, Mich.
Barry, Arthur A., Revere, Mass.
Barschak, Richard M., Hartford, Conn.
Beall, Robert C., Redkey, Ind.
Beebe, Gerald J., Fremont, Mich.
Beebe, Raymond I., Fremont, Mich.
Begg, Allan D., Battle Creek, Mich.
Belding, Sherl A., Pigeon, Mich.
Belding, Theodore C., Pigeon, Mich.
Bell, James Arthur, Alma, Mich.
Bender, David, New Haven, Conn.
Benedict, Herbert W., Canton, Ohio
Benson, Herbert J., Romulus, Mich.
Besancon, Fred W., Detroit, Mich.
Bigelow, Myron C., Clio, Mich.
Bisbee, John B., Dedham, Mass.
Blume, Ervin V., Fort Wayne, Ind.
Borst, George C., N. Quincy, Mass.
Brekke, Alfred E., Galloway, Wis.
Broome, Alfred O., Detroit, Mich.
Brown, Charls M., East Lansing, Mich.
Brown, Paul C., East Lansing, Mich.
Bryan, Claude S., East Lansing, Mich.
Bucholz, Harvey H., Wilton, Wis.
Bush, Charles T., Decatur, Mich.
Bush, Donald L., Augusta, Maine
Buth, Peter A., Comstock Park, Mich.
Campbell, Hope M., Madison, Wis.
Carlson, Paul A., Berkeley, Calif.
Carr, Glenwood F., Metamora, Ohio
Caswell, Donald E., North Adams, Mich.
Chapel, Donald E., Jackson, Mich.
Chapin, Norman G., Grandville, Mich.
Chapman, John H., Ontario, Calif.
Chazey, Edward P., Brooklyn, N. Y.
Cherin, Martin, Belleville, N. J.
Clark, Thomas W., Chesaning, Mich.
Clugston, Guy R., Royal Oak, Mich.
Cobble, John R., Charleston, Ill.
Colby, John M., Monroe, Mich.
Collins, Charles G., Kendall, Wis.
Condon, David J., Bloomington, Ill.
Connaughton, Harold W., Lawrence, Mich.
Coohon, Donald B., Sturgis, Mich.
Cooper, Arthur R., Highland Park, Mich.
Corrie, Garth, Lake, Mich.
Coy, Charles H., Detroit, Mich.
Cresswell, Richard A., St. Louis, Mich.
Crouch, Merlin W., Rose City, Mich.
Culham, Merrill, Stoughton, Wis.
Custer, Franklin D., Oakland, Md.
Darby, Charles W., East Lansing, Mich.
Davenport, Le Roy, Chicago, Ill.
Decker, Keith N., Colon, Mich.
Dedolph, George J., Mayville, Wis.
DeMeritt, Donald E., Hudson, Mich.
Dibble, Gipson D., Marshall, Mich.
Dole, Joel R., Danville, Vt.
Doll, Elvis R., Urich, Mo.
Dominguez, Celestino T., Guayama, Porto Rico
Drudge, Junion H., Bremen, Ind.
Drummond, William A., Detroit, Mich.
Drysdale, Robert J., Grosse Point, Mich.
Eads, Floyd, Urbana, Ill.
Eames, Henry P., Bowling Green, Mo.
Eggleston, Merlin D., East Lansing, Mich.
Eickholt, Kenneth C., New Lothrop, Mich.
Ellis, David J., Corunna, Mich.
Estes, George B., Mineral, Va.
Etchison, Kenneth L., Pinconning, Mich.
Fahlund, Luther A., Grand Rapids, Mich.
Fairbanks, Earl, Lyons, Mich.
Farnsworth, Lauriston B., Lakeview, Mich.
Feenstra, Ernest S., Grand Rapids, Mich.
Feinberg, Sidney, Long Branch, N. J.
Feldman, Frederick H., Dundee, Mich.
Ferguson, Frederick G., Grand Rapids, Mich.
Fireoved, De Loss W., Angola, Ind.

Fluharty, Dean M., Seattle, Wash.
Foster, Murray B., Romeo, Mich.
Freier, George G., Benton Harbor, Mich.
Fries, Jack H., Durand, Mich.

Gambrel, Paul T., Byron, Ill.
Garling, John Wm., Lake Orion, Mich.
Gavin, John H., Manchester, Mass.
Gelineau, Victor A., Lowell, Mass.
Gillet, Veronica R., Clinton, Mass.
Glucksman, Norman J., Newark, N. J.
Godisak, John J., Mattawan, Mich.
Goetz, Martin E., Hamtramck, Mich.
Goldsmith, Bernard, Yonkers, N. Y.
Goodband, George C., Newton Center, Mass.
Goodman, John T., Morenci, Mich.
Gowland, Joseph S., Valparaiso, Ind.
Graves, Walter L., Allegan, Mich.
Gray, Clinton W., Greensboro, Md.
Green, Merlin J., Williamsville, N. Y.
Greene, James, Passaic, N. J.
Greer, Joseph E., Gladwin, Mich.
Greiner, Norma L., Grand Rapids, Mich.
Groden, Claire, Detroit, Mich.
Grossman, Samuel M., Detroit, Mich.
Grover, Donald F., East Lansing, Mich.

Haflich, Robert C., Markle, Ind.
Haidy, Norman, Detroit, Mich.
Hamilton, Lafaye N., Detroit, Mich.
Hammer, Maxwell G., Rockford, Mich.
Hammerberg, Karl B., New London, Wis.
Harris, Harriett, Grand Rapids, Mich.
Hauser, Fred, Middleville, Mich.
Hawkins, Philip A., Lake Lansing, Mich.
Helwig, Roland A., Mendon, Mich.
Hergren, Douglas R., Rhinelander, Wis.
Hicks, Sherburne, Detroit, Mich.
Higgins, Raymond D., Dennysville, Maine.
Hodulik, Charles J., Clinton, N. J.
Holtz, Fred, Rochester, Mich.
Hornbacher, Vern G., Sebewaing, Mich.
Hotchkiss, Philip M., Niantic, Conn.
Houthoofd, Wm. A., Detroit, Mich.
Humerickhouse, Roland V., Omer, Mich.
Huntoon, Clifford C., Pontiac, Mich.
Hupp, Lynn D., Wayland, Mich.

Jackson, Ted F., Wayland, Mich.
Jackson, Wesley E., Wayland, Mich.
Jeffery, George W., Sherwood, Mich.
Jehle, Charles J., Flint, Mich.
Jenkins, Richard H., Lansing, Mich.
Jennings, Louis F., Plymouth, Mich.
Johnston, Richard L., Owosso, Mich.
Johnston, William R., Detroit, Mich.
Jones, Robert B., Lansing, Mich.
Joslin, Edward E., Fowlerville, Mich.
Kaser, Clarence L., Ovid, Mich.
Keim, Alvin A., Miami, Ind.
Kelly, Stephen R., Detroit, Mich.
Kendall, Donald A., Grand Rapids, Mich.
Kerlin, Delmar L., Chicago, Ill.
Kern, Sidney A., Detroit, Mich.
King, Harold C., Greenville, Mich.
King, Theodore C., Brookline, Mass.
Kinne, Harry W., Fargo, N. Dak.
Kloker, Paul F., Arenzville, Ill.
Klooster, Clarence J., Byron Center, Mich.
Klotz, Bruce F., Fort Wayne, Ind.
Knirk, Harold Wm., Quincy, Mich.
Kokx, Clayton E., Hart, Mich.
Konde, Wm. N., Dearborn, Mich.
Kortenber, John J., New Haven, Ind.
Kosht, Duane L., East Lansing, Mich.
Kraus, Leo G., Hart, Mich.
Krieger, George T., Williston, N. Dak.
Krinsky, Leonard D., Wildwood, N. J.
Krochmal, Albert M., Detroit, Mich.
Krushak, Donald H., Bridgeport, Conn.
Kuenster, Julius L., Chicago, Ill.
Laiho, Elmer R., Negaunee, Mich.
Langham, Robert F., East Lansing, Mich.
Langohr, William E., Columbia City, Ind.
Lannen, Richard P., Howell, Mich.
Larson, Arthur S., Lansing, Ill.
Larson, Roy G., Stambaugh, Mich.
Lee, Willard L., Iola, Wis.
Levine, Leo, Brooklyn, N. Y.
List, Edward M., Frankenmuth, Mich.
Lockwood, Mulford C., Williamston, Mich.
Loomis, Ladd N., Detroit, Mich.
Luoto, Lawrence, Gardner, Mass.
Lustig, Seymour, Newark, N. J.

MacArthur, Bruce, Flint, Mich.
McAfee, John T., Applegate, Mich.
McCallum, Jean R., Sturgis, Mich.
McCarty, Gailard T., Peck, Mich.
McCoy, Joseph L., Minden City, Mich.
McCoy, William J., Minden City, Mich.
McGhan, Clare L., Charlevoix, Mich.
McLeod, Kenneth L., Antigo, Wis.
Mackie, William, Metamora, Mich.
Marks, Allan A., Detroit, Mich.
May, Wallace G., Hart, Mich.
Mayne Robert F., Huntington, Ind
Merriman, George M., Carsonville, Mich.
Miller, Donald L., Lake City, Mich.
Miller, Paul T., Eaton Rapids, Mich.
Miller, Ralph E., Eaton Rapids, Mich.
Milliman, Earl M., Litchfield, Mich.
Moore, Donald L., Lansing, Mich.
Mootz, Charles E., Detroit, Mich.
Morill, Don R., East Lansing, Mich.
Morris, John D., Farmingdale, N. J.
Morse, Wendell C., Lansing, Mich.
Moser, James H., Rochester, Mich.
Mottel, Patricia J., Lansing, Mich.
Munro, Harry R., Zeeland, Mich.

Neuhauser, Maurice D., Fort Wayne, Ind.
Newcomb, Paul E., Newton Center, Mass.
Newlin, Louis R., Farmington, Mich.
Nichols, William J., Wayne, Mich.

O'Brien, Donal F., Newport, R. I.
O'Connor, Paul M., Monroe, Wis.
Olson, Royal E., Cadillac, Mich.
Osborn, Lee H., Danville, Ind.
Parkhurst, Benjamin R., Audubon, N. J.
Pede, Elmer R., Charlotte, Mich.
Perkins, Chester A., Lansing, Mich.
Perkins, Frederick E., Norfolk, Va.
Pfister, Kenneth R., Adrian, Mich.
Platt, Adrian T., Somerville, N. J.
Pollock, Samuel, E. Orange, N. J.
Pray, John D., East Jordan, Mich.
Pula, Joseph F., Standish, Mich.
Quinn, John F., Elkton, Mich.
Rader, William A., Sturgeon Bay, Wis.
Ritchie, James R., Plymouth, Mich.
Roberts, Irving M., Newark, N. J.
Ross, Burton A., Newark, N. J.
Rowley, Ralph M., Lansing, Mich.
Schaub, John A., Sodus, Mich.
Schaub, Richard E., Benton Harbor, Mich.
Schiller, Alfred G., Okemos, Mich.
Schneider, Herbert A., Grand Rapids, Mich.
Seidl, Roger P., Menominee, Mich.
Semenow, Ruth, Pittsburgh, Pa.
Sharrard, Parker E., Imlay City, Mich.
Sheets, Waynard R., Frankfort, Ind.
Sherber, Murray H., Brooklyn, N. Y.
Shillinger, Robert B., Grand Rapids, Mich.
Shirley, Dorothy E., Pontiac, Mich.
Shogan, Marvin, Detroit, Mich.
Shull, Albert J., Capac, Mich.
Shuttleworth, William W., Warren, Mass.
Siegle, Harrison B., Brookline, Mass.
Siegmund, Otto H., Detroit, Mich.
Simerson, Foch El, Harriette, Mich.
Simons, Henry, Colon, Panama
Sisco, Raymond, Exeter, Calif.
Skoyen, Palmer, Eleva, Wis.
Smith, Alan R., Elmore, Minn.

Spencer, Adelbert J., Lansing, Mich.
Stacy, Elmer J., Escanaba, Mich.
Stahl, Charles H., Grosse Point, Mich.
Staples, Marjorie A., Birmingham, Mich.
Starkey, Arthur L., East Lansing, Mich.
Steele, James H., East Lansing, Mich.
Steensma, Rommy, Holland, Mich.
Sterner, Edward F., Imlay City, Mich.
Stevens, David F., Mount Morris, Ill.
Stewart, Robert G., East Lansing, Mich.
Stoe, Lyle A., Churchs Fry, N. Dak.
Strong, Warren M., Northampton, Mass.
Stuewer, George H., Howard City, Mich.
Sullivan, David J., Detroit, Mich.
Ten Broeck, Charles W., East Detroit, Mich.
Thomas, John G., Dodgeville, Wis.
Trombley, Harvey R., Kewaunee, Wis.
Tuder, Gabriel W., Bayonne, N. J.
Turner, George W., Imlay City, Mich.
Vander Wall, Edwin R., New Era, Mich.
Van Tilborg, Evan J., Kalamazoo, Mich.
Vigue, Rosaire F., Waterville, Maine
Wagaman, Paul H., Kokomo, Ind.
Walters, Carlton A., Monticello, Wis.
Waterfall, Clark, Fort Wayne, Ind.
Watson, Lawrence B., Coldwater, Mich.
Webb, William W., Kewaunee, Wis.
Webster, Harris D., Lansing, Mich.
Weinland, Kenneth M., Fort Wayne, Ind.
Weldy, Maurice, Goshen, Ind.
Westcott, Roy Wm., Detroit, Mich.
Westcott, William J., Detroit, Mich.
Wheeler, James E., Montpelier, Vt.
White, George P., Romeo, Mich.
Whitmore, George E., Whitestown, Ind.
Wilson, John A., Burlington, Wis.
Wise, Gilbert H., Grand Rapids, Mich.
Wolff, Arthur H., Trenton, N. J.
Wong, Jehim Foon, Lansing, Mich.
Wood, Ivan H., Scottville, Mich.
Woodward, John B., Madison, Wis.
Woolson, Charles C., Clio, Mich.
Wright, Betty J., Pleasant Ridge, Mich.
Yabsley, Francis G., Cessna Park, Ill.
Yocom, Emery J., Winimac, Ind.
Young, William C., Detroit, Mich.
Zeldner, Joseph, Hartford, Conn.

University of Montreal

First Year

Bernard, Byron Wright, Cincinnati, Ohio
Dye, H. Kenyon, Gloversville, N. Y.
Esdrada, Emilio, Guatemala City, Guatemala.
Poirier, Lucien, Montreal, Que.

Second Year

Breton, Jos. Edouard, Lotbinière, Que.
Dumas, Benoit, Trois-Pistoles, Que.
Faucher, Benjamin, Yamaska, Que.
Houle, Germain, Bagot, Que.
Lanthier, Anthime, Dalkeith, Ont.
Lawlor, Edouard, Montreal, Que.
Leblanc, Alcide, Moncton, N. B.
Masse, Richer, Quebec.
Ortiz, Lionel, Montreal, Que.
Pelletier, Andre, Yamaska, Que.
Plouffe, Adelard, Bagot, Que.

Third Year

Bellavance, Raymond, Rimouski, Que.
Choquette, Philodore, Marieville, Que.
Colpron, Gerard, Laprairie, Que.
Denis, Edouard, Berthier, Que.
Desilets, Vianney, Montreal, Que.
Frenette, Marcel, Montreal, Que.
Gauthier, Geo.-Etienne, Yamaska, Que.
Jacques, Ephrem, L'Assomption, Que.
Lavallee, Albert, Sorel, Que.
Savoie, Jean-Paul, Berthier, Que.
Troalen, Rene, Montreal, Que.

Fourth Year

Beaudry, Charles-Ed., Bagot, Que.
Boulanger, Paul, N. D. des Bois, Que.
Chartier, Jos.-Edouard, Terrebonne, Que.
Galarneau, Benoit, L'Assomption, Que.
Gelinas, Louis de Gonzague, Montreal, Que.
Gosselin, Louis-Emile, Bellechasse, Que.
Lafortune, Jean-Guy, Montreal, Que.
Lefebvre, Albert, Laprairie, Que.
Legare, Edmour, St-Hyacinthe, Que.
Leveille, Camille, Riviere du Loup, Que.
Payette, Maurice, Montreal, Que.
Trepanier, Martin, Champlain, Que.

The Ohio State University

First Year

Becker, Paul, Jr., Defiance, Ohio
Bills, Robert D., Columbus, Ohio
Booher, Howard E., Piqua, Ohio
Boyd, Waive O., Millersburg, Ohio
Brewer, James A., Fairmount, Ind.
Bunker, Von Clyde, Los Angeles, Calif.
Catcott, Earl J., Louisville, Ohio
Cates, John P., Modoc, Ind.
Chadwick, Ralph D., New Richmond, Ind.
Clayton, Frederick W., Greenfield, Ohio
Cornett, Harry D., Morrow, Ohio
Crawford, Harry B., Columbus, Ohio
Crowder, Arthur L., North Lewisburg, Ohio
Danis, John E., Cleveland, Ohio
Diesem, Charles D., Galion, Ohio
Edwards, Robert J., Youngstown, Ohio
Elliott, Herbert B., West Mansfield, Ohio
Enderle, Wayne Ward, Huron, Ohio
Erdmann, Arden A., Niles Center, Ill.
Evans, Ralph W., Stone Creek, Ohio
Farmer, John H., Buechel, Ky.
Fireoved, Ralph T., Mendon, Ohio
Fisher, Robert I., Euclid, Ohio
Folsom, Robert H., Bellefontaine, Ohio
Glass, Howard R., Springfield, Ohio
Green, Elton L., Shadyside, Ohio
Grossman, Richard W., Mt. Vernon, Ohio
Hansberger, Charles H., Millersport, Ohio
Hight, Jack, Massillon, Ohio
Hopping, Jerry L., Atlanta, Ga.
Jacobs, Harold D., Cincinnati, Ohio
Jones, David O., Lakewood, Ohio
Kocher, Ralph, Jr., Lancaster, Ohio
Little, Paul, Greensburg, Ind.
Lloyd, Kenneth E., Marengo, Ohio
Lobach, William S., Easton, Pa.
MacDonald, Daniel G., Gary, Ind.
McBride, Dwight M., Bucyrus, Ohio
McGough, William R., Lima, Ohio
Meyer, Billy J., Greensburg, Ind.
Miller, Charles W., Crestline, Ohio
Moore, John F., Cincinnati, Ohio
Moore, John W., Middletown, Ohio
Nickell, Vernie L., Winchester, Ky.
Olds, Durward, Conneaut, Ohio
Pleasant, George E., Londonderry, Ohio
Reinhard, Richard A., Columbus, Ohio
Rodabaugh, Edwin R., Williamstown, Ohio
Rudy, Richard L., Pleasant Hill, Ohio
Sachs, Sherman D., Cleveland, Ohio
Saunders, Edward C., Chicago, Ill.
Schmidt, Donald W., Cincinnati, Ohio
Schnurrenberger, Leroy W., Youngstown, Ohio

Shotton, James B., Amherst, Ohio
Skidmore, Merritt E., West Mansfield, Ohio
Smith, Carl W., Clyde, Ohio
Starr, Hugh S., Mt. Sterling, Ohio
Stockton, Jack J., Paris, Ohio
Taylor, Warren J., Xenia, Ohio
Vesper, Robert W., Columbus, Ohio
Walker, Waldo F., Columbus, Ohio
Wallman, Harold, Chicago, Ill.
Wenner, Harold R., Carey, Ohio
White, Vera J., Grove City, Ohio
Wilson, John O., Columbus, Ohio
Worley, Raymond W., Delaware, Ohio
Caldwell, Nancy Lee, Wheeling, W. Va.

Second Year

Abbott, William L., Columbus, Ohio
Bailey, Robert M., Columbus, Ohio
Baumgartner, Robert W., Ft. Wayne, Ind.
Blair, Albert R., Cleveland, Ohio
Bremer, Louis H., Portsmouth, Ohio
Burton, Arthur A., Westerville, Ohio
Chehayl, Clarence J., Cleveland, Ohio
Clark, Robert P., Bellefontaine, Ohio
Claugus, Frederick W., Woodsfield, Ohio
Cole, Clarence R., Crestline, Ohio
Converse, James M., Akron, Ohio
Dahmen, John R., Cortland, Ohio
Dixon, George F., St. Marys, Ohio
Duber, Anthony G., East Cleveland, Ohio
Faulkner, Harold W., Columbus, Ohio
George, John H., Columbus, Ohio
Gibbs, Robert R., Columbus, Ohio
Grundish, Roger W., St. Marys, Ohio
Hall, Howard H., Columbus, Ohio
Heinsen, Paul B., Port Clinton, Ohio
Henthorne, Dale R., Marietta, Ohio
Hodesson, Samuel, Youngstown, Ohio
Hollingshead, Ervon E., Columbus, Ohio
Howard, Fritz A., Toledo, Ohio
Junk, Dick, Washington C. H., Ohio
Krantz, Elden C., Dover, Ohio
Lamb, Hugh, Ashville, Ohio
Lantis, George Wm., Jr., Mendon, Ill.
Little, Robert D., Jeffersonville, Ohio
Mainwaring, Glyn T., Columbus, Ohio
McCabe, Edward N., Columbus, Ohio
McClarren, Richard M., Columbus, Ohio
McQuown, Paul P., Tucson, Ariz.
Meisinger, Fred H., Jr., Naperville, Ill.
Miller, Robert R., Ben Avon, Pa.
Milton, Charles S., Charles Town, W. Va.
Montgomery, Charles W., Xenia, Ohio
Neel, John C., Hebron, Ohio
Newton, William H., Ashville, Ohio
Nickerson, John H., Orwell, Vt.
Oldham, William R., Charlottesville, Ind.
Patton, Clyde A., Springfield, Ohio
Peck, Edsell C., West Middletown, Ohio
Priestley, Archie C., Gallipolis, Ohio
Ranck, Wesley A., Columbus, Ohio
Ripley, Richard A., Kent, Ohio
Ross, Walter E., Cuyahoga Falls, Ohio
Rumpler, Ward V., Cleveland, Ohio
Schindler, John, Jr., Belvidere, Ill.
Schoonover, Hobart D., Findlay, Ohio
Southard, Francis I., Louisville, Ky.
Spanabel, John J., East Palestine, Ohio
Sprowl, Raymond W., Salem, Ohio
Stewart, Kenneth E., Clarksville, Ohio
Stout, Robert W., Bennington, Ind.
Tornes, William A., Columbus, Ohio
Tossey, Carrol P., Columbus, Ohio
Traphagen, Douglas V. V., Toledo, Ohio
Vollmer, John H., Toledo, Ohio
Voss, Robert F., Lewistown, Ohio
Walker, James M., Warsaw, Ohio
Walters, Ralph D., Columbus, Ohio
Weight, Thomas H., Newark, Ohio
Weil, Fred., Elyria, Ohio
Welbourn, Russell W., Union City, Ind.
Winkler, Jack E., Ft. Thomas, Ky.
Wynkoop, Judson R., Columbus, Ohio
Hall, William L., Columbus, Ohio

Third Year

Baker, Robert F., Buckland, Ohio
Benedict, Melvin C., Akron, Ohio
Bennett, Rothbee H., Columbus, Ohio
Bolton, William O., Washington C. H., Ohio
Bridenstine, William A., West Jefferson, Ohio
Britton, Allen Q., Toledo, Ohio
Carlin, Louis, Cleveland, Ohio
Clymer, Elza E., Napoleon, Ohio
Coble, Marvin M., Huntington, Ind.
Crago, Verle G., Columbus, Ohio
Davis, James R., Hardinsburg, Ind.
Dick, John R., New Holland, Ohio
Delaplane, Frank, Greenville, Ohio
Dimick, Alan H., Aurora, Ohio
Engard, Richard M., Marysville, Ohio
Foley, Randall J., Brookline, Pa.
Friedburg, Klaus, Lakewood, Ohio
Garverick, Wade W., Mt. Gilead, Ohio
Glover, Robert C., Kansas City, Mo.
Gross, Irwin, Cleveland, Ohio
Harries, Chester E., Hurley, Wis.
Harter, Herold M., Jr., Toledo, Ohio
Hicks, Joseph M., Hillsboro, Ohio
Hildebrand, Wm. M., Piqua, Ohio
Ingalls, Wm. L., Galloway, Ohio
Johnson, LeRoy E., Columbus, Ohio
Keene, Paul M., Shabbona, Ill.
Knable, Joseph F., Floyd Knobs, Ind.
Lamkin, Wm. E., Patriot, Ind.
Lester, Gardiner A., Columbus, Ohio
Livingston, Robert M., Mechanicsburg, Ohio
Lyday, Charles V., Columbus, Ohio
Mairs, Robert E., Shreve, Ohio
McClaskey, Walter D., Prospect, Ohio
Miller, John G., Columbus, Ohio
Mingle, Hugh F., Anderson, Ind.
Norris, Wm. E., Coshocton, Ohio
Paden, Edward C., South Bend, Ind.
Place, Robert A., St. Marys, Ohio
Prushing, Leroy C., Worthington, Ohio
Pugh, Paul H., Columbus, Ohio
Ramge, John C., Wapakoneta, Ohio
Reineck, Frederick C., Gibsonburg, Ohio
Rhinebarger, Roy R., Columbus, Ohio
Sage, Helen P., Columbus, Ohio
Seward, Charles O., Cleveland, Ohio
Sharp, John C., Worthington, Ohio
Stein, Irving, Cleveland, Ohio
Switzer, Ernest E., Andover, Ohio
Welty, Kenneth D., W. Mansfield, Ohio
Wilcox, William A., South Boston, Mass.
Williamson, Myron, Montpelier, Ind.
Williamson, Richard L., Montpelier, Ind.

Fourth Year

Amerine, Ivan E., Canal Winchester, Ohio
Beamer, Paul D., Columbus, Ohio
Berthold, Norman R., Lakewood, Ohio
Boyd, Wayne W., Elyria, Ohio
Burrell, John V., Columbus, Ohio
Carpenter, Paul R., Kent, Ohio
Chambers, Walter M., New Lyme, Ohio
Chase, Irving N., Columbus, Ohio
Collier, John R., Marysville, Ohio
Cooper, Stanley R., Cleveland, Ohio
Davison, Roy H., Cleveland, Ohio
Dinsmore, Jack R., Lima, Ohio
Douglass, Frank W., Columbus, Ohio
Dunlap, Floyd P., Circleville, Ohio
Gardner, Paul, Columbus, Ohio
Gardner, Richard S., Kingston, Ohio
Gluhm, Frank N., Hamilton, Ohio

Gray, Hollis A., Clyde, Ohio
Gutridge, Frederick D., Granville, Ohio
Habel, Robert E., Toledo, Ohio
Headley, Ralph E., Reynoldsburg, Ohio
Heinrich, Cyril Leo, Hamilton, Ohio
Hempy, Jack H., Groveport, Ohio
Herring, Raymond L., Oak Harbor, Ohio
Hilsheimer, Wilbert G., Chillicothe, Ohio
Hinchman, Lowell W., Glenwood, Ind.
Jones, Lowell M., Rushsylvania, Ohio
Jordan, Justin E., Cleveland, Ohio
Karcher, James N., Forest, Ohio
Klein, Ben, Geneva, Ohio
Kline, Dale S., Thorntown, Ind.
Knappenberger, Robert E., Bucyrus, Ohio
Kottenbrock, Amos F., Ottawa, Ohio
Latier, Robert E., Coshocton, Ohio
Leed, Robert H., North Canton, Ohio
Lusk, David E., Ashtabula, Ohio
Menges, Robert W., Cleveland, Ohio
Mitchell, Francis S., Alliance, Ohio
Pinfold, Russel W., Cincinnati, Ohio
Price, Lawrence W., Liberty Center, Ohio
Rasi, Laddie B., Cleveland, Ohio
Richards, Jacob P., Cleveland, Ohio
Ross, Charles P., Greenville, Ohio
Simione, John R., Youngstown, Ohio
Sims, Jacob B., Pleasantville, Ohio
Sluss, Robert E., Louisville, Ohio
Smith, Robert F., Columbus, Ohio
Stauffer, Douglas R., Bucyrus, Ohio
Stewart, Marvin C., Wren, Ohio
Swart, Phillip B., Warren, Ohio
Terrill, Lloyd H., Ridgeway, Ohio
Todd, Donald O., Delta, Ohio
Wallace, Paul H., Fort Branch, Ind.
Wolfe, Gerald J., Mt. Victory, Ohio

Ontario Veterinary College

First Year

Ballantyne, G. R., Stratford, Ont.
Chappel, W. R., Guelph, Ont.
Cherry, D. R., Ottowa, Ont.
Dashner, G. W., Fisherville, Ont.
Gurofsky, Mary J., Toronto, Ont.
Hawke, T. W., Chatsworth, Ont.
Marcus, J. F., Kincordine, Ont.
Matrie, W. M., Guelph, Ont.
Rammage, C. S., Oakland, Ont.
Rushton, A., Guelph, Ont.
Turnbull, R. B., Dashwood, Ont.
Watt, W. A., Buffalo, N. Y.
Webster, E. H., Lansdowne, Ont.

Second Year

Carney, John J., Kelowna, B. C.
Crawley, John F., Guelph, Ont.
Dalton, J. C., Toronto, Ont.
Ferraro, Angelo, Guelph, Ont.
Fitts, Robert H., South Euclid, Ohio
Fleming, Lloyd H., Ashton, Ont.
Fritz, LeRoy C., Silver Creek, N. Y.
Gilbertson, Gordon E., Hagersville, Ont.
Lamont, Campbell, Mt. Brydges, Ont.
Lott, David G., Warrington, Eng.
MacDonald, G. I., Mount Royal, Que.
Morris, Chas. F., Vancouver, B. C.
Moynihan, Walter, Toronto, Ont.
Murray, George, Tobago, B. W. I.
Newlon, Robert D., New Brighton, Pa.
Peterson Gordon A., Kitchener, Ont.
Poland, Melvin E., Brigden, Ont.
Reuber, Herbert W., Ayton, Ont.
Steadman, Henry R., Erie, Pa.
Vandenriessche, Jos. E., Weyburn, Sask.
Wang, Peter C., Hawkesbury, Ont.
Ballantyne, Edwin, St. Pauls, Ont.
Beattie, Ralph D., Guelph, Ont.
Bordato, James C., Leamington, Ont.
Browne, Erle W., Guelph, Ont.
Campbell, G. A., Westmount, Que.
Carter, Gordon R., Guelph, Ont.
Christie, D. C., Port Perry, Ont.
Comfort, C. F., Mt. Brydges, Ont.
Corrigan, Leo W., Hannon, Ont.
Damude, D. F., Niagara Falls, Ont.
Day, Joseph E., Alma, Ont.
Drover, Jack E., Seaforth, Ont.
Earl, Edward R. C., Hamilton, Bermuda.
Fisher, G. C., Sackville, N. B.
Goossen, I. G., Steinbach, Man.
Hanna, Alex. A., Mitchell, Ont.
Hanna, Geo. E., Stayner, Ont.
Hawkins, R. A., Brownsville, Ont.
Henderson, G. W., Lambeth, Ont.
Kenney, R. H., Burlington, Ont.
Knox, Maruce H., Millbank, Ont.
Lambert, R. S., Guelph, Ont.
Lawrence, R. E., Lindsay, Ont.
Leclaire, H. A. R., St. Adolphe, Man.
Levie, Lloyd G., Sault Ste. Marie, Ont.
Lomas, J. M. C., Millgrove, Ont.
Loos, Paul W. J., Kitchener, Ont.
MacKinnon, A. J., Zurich, Ont.
Magwood, Stuart E., Hanover, Ont.
Martin, William P., Guelph, Ont.
McCallum, Rex, Brownlee, Sask.
McCormick, Gerald E., Athelstan, Que.
Nagge, William T., Guelph, Ont.
Newby, W. Clayton, Sardis, B. C.
Nundal, Elford L., Langley Prairie, B. C.
Robertson, D. B., Ottawa, Ont.
Sayers, Hubert M., Feversham, Ont.
Schuett, Leo R., Walkerton, Ont.
Selke, J. Chilton, Toronto, Ont.
Sheppard, J. T. B., Burlington, Ont.
Shipsides, S. H., Penetanguishene, Ont.
Smith, D. L. T., Winnepeg, Man.
Smith, Jane B., Toronto, Ont.
Soltys, Albert, Miami, Man.
South, Peter J., Silver Creek, Sask.
Steep, Wm. A., Guelph, Ont.
Steeves, Donald M., Moncton, N. B.
Stirk, Gerald D., Brampton, Ont.
Talbot, Gerald P., Westwold, B. C.
Taylor, Ian W., Hamilton, Ont.
Walker, Morton L., Newmarket, Ont.
Waller, C. Laverne, Brampton, Ont.
Wilton, Graham S., Poland, Man.
Zlotnich, Leon, Winnipeg, Man.

Third Year

Anderson, Winston, Guelph, Ont.
Armstrong, Albert B., Guelph, Ont.
Baux, Gordon A., Chippawa Hill, Ont.
Behan, J. A. T., St. Catharines, Ont.
Black, J. Gilbert, Stayner, Ont.
Boyce, Geo. H., Woodstock, Ont.
Brewster, H. Jean, Hespeler, Ont.
Brisbane, W. P., Aldershot, Ont.
Byer, Lloyd C., Woodville, Ont.
Carere, C. C., Guelph, Ont.
Cawker, W. T., Port Perry, Ont.
Chiles, J. Nelson, Havelock, Ont.
Clarke, James N., Guelph, Ont.
Connell, Robert, Aberdeen, Sask.
Cowan, W. H., Guelph, Ont.
Dancey, John C., Aylmer, Ont.
Deanef, Wm. A., Toronto, Ont.
Durrell, W. B., Foster, Que.
Fish, Norman A., Streetsville, Ont.
Gahagan, R. G., London, England.
Gandier, Carlyle, Malton, Ont.
Goudy, Jean, Baltimore, Md.
Griesbach, R. K., Collingwood, Ont.
Guldenschuh, W. B., Rochester, N. Y.
Hall, A. Victor, Antigua, B. W. I.
Hall, Lloyd C., Guelph, Ont.
Hill, W. L. F, Guelph, Ont.

Kidd, Abraham, New Westminster, B. C.
Lapp, Beverley W., Woodville, Ont.
Laurin, Jean-Louis, Mont-Laurier, Que.
Leatherdale, John B., Simcoe, Ont.
Lingua, Peter F., Windsor Locks, Conn.
MacDonald, Donald, Guelph, Ont.
MacLeod, George N., Stellarton, N. S.
MacMaster, D. C., Port Perry, Ont.
McCabe, W. Jas., Bolton, Ont.
McSherry, B. J., Port Credit, Ont.
Millidge, E. G., Winnipeg, Man.
Mitchell, C. J., Brantford, Ont.
Mitchell, Jas. M., Chatsworth, Ont.
Mitges, Constantine, Guelph, Ont.
Morley, Walter D., Elmwood, Ont.
Mulchinock, Wm. J., Guelph, Ont.
Nicholson, W. R., Lashburn, Sask.
Norquay, John P., Fort Gary, Man.
O'Donoghue, Gerard, Stratford, Ont.
Prest, Victor, Niagara Falls, Ont.
Rattray, A. J., Wainwright, Alta.
Reeds, Clement R., Omemee, Ont.
Reeker, W. Harold, Simcoe, Ont.
Ross, A. R., Meadowville, N. S.
Rothmel, E. L., Guelph, Ont.
Schroder, D. K., Guelph, Ont.
Schroder, J. D., Guelph, Ont.
Shain, Norman J., Wyoming, Ont.
Smith, Daniel J., Hagersville, Ont.
Spencer, H. C., Oxenden, Ont.
Sproule, John D., Guelph, Ont.
Stiles, W. C., Brussels, Ont.
Stratas, Jack, Toronto, Ont.
Thompson, David C., Virden, Man.
Thomson, Jack S., Miami, Man.
Walton, Ross, Rocky Mountain House, Alta.
Whiteside, W. H., Port Dover, Ont.

Fourth Year

Anderson, H. T., Whitelaw, Alta.
Anderson, J. L. S., Winnipeg, Man.
Barker, C. V., Ingersoll, Ont.
Barnum, D. A., Campbellford, Ont.
Beattie, J. H., Acton, Ont.
Bigland, C. H., Calgary, Alta.
Blum, F. E., Stratford, Ont.
Browne, D. J. Guelph, Ont.
Bryson, H. L., New Westminster, B. C.
Butterwick, D. B., St. Thomas, Ont.
Button, Clarence S., New Melbourne, Nfd.
Cady, J. H., Utica, N. Y.
Campbell, Kenneth C., Galt, Ont.
Carnegie, G. C., Winnipeg, Man.
Chamberlayne, E. C., New Westminster, B. C.
Clark, J. S., Forest, Ont.
Coghlin, C. L., Listowe, Ont.
Coleman, L. G., Carleton Place, Ont.
Colgate, R. F., Weston, Ont.
Collins, H. C., Winnipeg, Man.
Coxon, E. N., Milverton, Ont.
Donovan, J. F., Dushore, Pa.
Eddy, Edward C., Brantford, Ont.
Elliott, G. S., Clinton, Ont.
Elliott, J. A., Dundalk, Ont.
Ellis, V. A., Holstein, Ont.
Gallagher, J. A., Buffalo, N. Y.
Gibbs, Harold F., Clinton, Ont.
Groves, R. W., Fenelon Falls, Ont.
Hanlon, P. F., Guelph, Ont.
Jones, G. H., Brampton, Ont.
Kirk, R. J., Winnipeg, Man.
LeGrow, Ralph, Broad Cove, B. D. V., Nfd.
Lougheed, V. H., Dundalk, Ont.
MacLennan, K. M., Ripley, Ont.
Marshall, R. J., Strongfield, Sask.
Maude, S. H., Guelph, Ont.
McPhee, John N., Toronto, Ont.
Moffat, Colvin, Teeswater, Ont.
Mollison, L. G., Guelph, Ont.
Mount, Harry F., Sharon, Ont.
Munro, D. A., Powasson, Ont.
Murray, R. B., Toronto, Ont.
Parkhill, W. L., Moose Jaw, Sask.
Pickell, A. D., Marquette, Man.
Rainey, W. J., Hamilton, Ont.
Reid, D. C., Drayton, Ont.
Reid, Vern H., Wheatley, Ont.
Rivington, N. W., Novon, Ont.
Robinson, Jack E., Morrisburg, Ont.
Robson, G. F., Denfield, Ont.
Rushton, Harry, Guelph, Ont.
Scott, J. H., Stayner, Ont.
Smiley, R. G., Rawdon, Que.
Storry, W. J., Bladworth, Sask.
Turnbull, J. O., Brussels, Ont.
Williams, Edith B., Aurora, Ont.
Woolsey, I. J., Kingston, Ont.
Woolsey, L. D., Kingston, Ont.

University of Pennsylvania

First Year

Ainslie, Douglas H., Chicopee, Mass.
Alberts, Joseph O., Champaign, Ill.
Arnold, Maurice W., Stafford Springs, Conn.
Bearint, Beryl, Philadelphia, Pa.
Bender, John W., Lititz, Pa.
Blum, Clayton I., Philadelphia, Pa.
Bollens, Kennth L., Pittsburgh, Pa.
Brachman, Bernard, Millville, N. J.
Brown, John W., Irvington, N. J.
Burton, Harold F., Parkton, Md.
Carlson, Vance A., Port Allegany, Pa.
Clark, Mary A., New Castle, Del.
Daugherty, Edward B., Jr., Delmar, Del.
Derrer, Lee W., Mt. Carroll, Ill.
Deubler, James A., Newtown, Pa.
Dougherty, Ellsworth, Rutledge, Pa.
Downing, Theodore O., Petersburg, Va.
Farber, Sheldon S., Philadelphia, Pa.
Finkelstein, Jacob, Philadelphia, Pa.
Frater, Robert B., Berkeley, Calif.
Gemberling, Arthur R., Jr., Woodstown, N. J.
Gibbs, Robert E., Lancaster, Pa.
Grim, Courtney K., Winchester, Va.
Gulick, Wm. C., Blooming Glen, Pa.
Hardenbergh, James G., Princeton, N. J.
Haverstick, Donald, Atlantic City, N. J.
Hettig, Edwin S., Lehighton, Pa.
Ibsen, David, Glen Lyon, Pa.
Jaffe, Marvin A., Philadelphia, Pa.
LaGarde, Ben L., Rockville, Md.
LeBovit, George B., Newark, N. J.
Liberi, Ercole J., Philadelphia, Pa.
Loveless, Richard S., Greenville, Pa.
McCullough, John D., Corsica, Pa.
McGrath, John T., Drexel Hill, Pa.
Mathey, Wm. J., Clifton, N. J.
Minarik, Wm. H., Vandergrift, Pa.
Moor, John W., Trenton, N. J.
Moorehead, Charles A., Bedford, Pa.
Moulton, Wm. M., Concord, N. H.
Nemeth, John D., New York, N. Y.
Nitsch, Norbert C., Jr., Baltimore, Md.
O'Neal, Joseph M., Loogootee, Ind.
Patterson, Arthur W., Jr., York, Pa.
Ramey, Donald B., Waynesboro, Pa.
Ricker, Harry G., Waynesboro, Pa.
Sanson, John, Hopewell, N. J.
Shinn, Benjamin J., Jr., Norfolk, Va.
Smith, Harold M. S., East Orange, N. J.
Twitchell, Carl A., South Orange, N. J.
Tyler, George W., Drexel Hill, Pa.
Wentzel, Earl E., Grafton, Pa.

Second Year

Abramson, Joseph, Philadelphia, Pa.
Berkelhammer, Albert M., Newark, N. J.

Brown, Joseph F., Dunsmuir, Calif.
Collins, Daniel J., Pittsfield, Mass.
DeMott, Thomas, Millington, N. J.
Doolittle, Herbert S., New Haven, Conn.
Downhill, Wallace J., Springfield, Mass.
Elting, Stewart E., No. Woodbury, Conn.
Folling, Bjarne N., Encino, Calif.
Fridirici, Ira M., Orwigsburg, Pa.
Gardner, Harold H., South Gibson, Pa.
Good, Archie L., Hershey, Pa.
Groveman, Joseph, Bordentown, N. J.
Guss, Samuel B., Reading, Pa.
Hall, Jonathan P., Lowell, Mass.
Hickman, George R., Jr., Brighton, Mass.
High, Wm. P., Middletown, Pa.
Hitchner, Stephen B., Daretown, N. J.
Hornaday, Wayne A., Greensboro, N. Car.
Iobst, F. Murray, Emmaus, Pa.
Keeler, John R., Washington, D. C.
Knipe, Hesser, Orwigsburg, Pa.
Kutish, Edward S., Plains, Pa.
Larson, Howard S., Deep River, Conn.
Lippincott, John E., Haddonfield, N. J.
Liscomb, John M., Hancock, Maine.
McLaughlin, Paul R., Nashua, N. H.
Mattern, George W., Mt. Union, Pa.
Miller, George W., Ambler, Pa.
Norris, Henry W., New Milford, Pa.
O'Keefe, Francis A., Jr., Warrentown, Va.
Osen, Edwin J., Anita, Iowa
Power, Frank E., Birdsboro, Pa.
Ross, Morris H., Philadelphia, Pa.
Ryan, Edward T., Jr., Brookline, Mass.
Shellenberger, James M., Tannersville, Pa.
Simington, Joseph O., Danville, Pa.
Sperling, Francis G., Prospect Park, Pa.
Stefanick, Jack E., Sharpsville, Pa.
Strittmatter, Thomas P., Brandywine Summit, Pa.
Swartz, Abraham L., Huntingdon, Pa.
Thorp, Albert D., Philadelphia, Pa.
Wade, George N., Camp Hill, Pa.
Waple, Marshall J., Jr., Washington, D. C.
Weber, Robert B., Mechanicsburg, Pa.
Whitlock, James A., Noroton, Conn.

Third Year

Bonese, Mathew J., Aspinwall, Pa.
Bree, Max, Philadelphia, Pa.
Brown, Wm. J., Philadelphia, Pa.
Burr, Orville L., Chester, Conn.
Buzby, Gordon P., Philadelphia, Pa.
Campbell, Joseph C., Washington, Pa.
Chain, John J., Narberth, Pa.
Conrad, George L., South Gibson, Pa.
Crutchfield, Wm. O., South Hill, Va.
Detweiler, David K., Upper Darby, Pa
Ellsworth, Leslie L., Jr., Meshoppen, Pa.
Fabricant, Julius, Philadelphia, Pa.
Freitas, Edward D., Dartmouth, Mass.
Grammes, June, Bethlehem, Pa.
Gutzwiller, Robert L., Plainfield, N. J.
Harrison, John H., East Orange, N. J.
Hastings, Joseph W., Jr., Cambridge, Md.
Hobart, Claude D., Philadelphia, Pa.
Jaqueth, John M., Jr., Verona, N. J.
Kaskin, Samuel T., Elmer, N. J.
Ker, Wm. O., Carlisle, Pa.
Kolson, Morton, Philadelphia, Pa.
Kopp, Howard J., North Bergen, N. J.
Mackey, Walter L., Jr., Sharon Hill, Pa.
Martin, John E., E. Lansdowne, Pa.
Moyer, James W., Selinsgrove, Pa.
Patterson, Philip A., Orangeville, Pa.
Pease, Clinton L., Eighty-Four, Pa.
Poppensiek, George C., Bogota, N. J.
Raker, Charles W., Daylesford, Pa.
Richman, Herbert, Philadelphia, Pa.
Robbins, MacIntyre C., Washington, D. C.
Roll, Carroll A., Hilo, Hawaii
Rothe, Wm. E., Roselle Park, N. J.
Smith, Russell E., Methuen, Mass.
Stern, Douglas N., Catasauqua, Pa.
Tierkel, Ernest S., Philadelphia, Pa.
Urban, Wm. D., Clarksboro, N. J.
Valentine, Harold D., Washington, D. C.
Willis, Thomas E., Lansdowne, Pa.
Witsky, Ernest, Philadelphia, Pa.

Fourth Year

Allen, Clifford A., Memphis, Tenn.
Babe, Carl R., Twin Oaks, Pa.
Baily, Wm. H., Oxford, Pa.
Barlow, Ruth M., Amherst, Mass.
Barton, Robert A., Endicott, N. Y.
Beatty, Millard S., Lima, Pa.
Bond, Wm. P., Brockway, Pa.
Boyens, Raymond W., Chicago, Ill.
Brown, Thomas W., Fawn Grove, Pa.
Burkhart, Robert L., Nutley, N. J.
Churchill, Edwin A., Ravenscroft, Phillipsburg N. J.
Collins, Elizabeth J., Short Hills, N. J.
Dionne, Bertrand B., Lewiston, Maine
Edwards, Myles J., Norwich, Conn.
Ellmers, Gordon R., Bogota, N. J.
Ely, John B., Oxford, Pa.
Fouse, Gerald H., Martinsburg, Pa.
Gates, Glenn D., Clarksdale, Miss.
Grim, Burnell H., Abbottstown, Pa.
Jacquette, Daniel S., Swarthmore, Pa.
Johnson, Peter Van B., Ashland, Mass.
Labold, Jack J., Allentown, Pa.
Leaming, Joseph D., Philadelphia, Pa.
Leighton, Robert L., Roslindale, Mass.
Lerch, Robert J., Philadelphia, Pa.
MacKenzie, Eugene R., Concord, N. H.
McEwan, Alan F., Cooperstown, N. Y.
Maloney, Roger J., Meadville, Pa.
Martin, Kenneth H., Randolph, N. Y.
Metzger, Philip P., Columbia, Pa.
Mullen, Francis E., Newmarket, N. H.
Nichols, Robert W., Ridgewood, N. J.
O'Connor, James T. Jr., Woburn, Mass.
Phillips, John Q., Bellevue, Pa.
Rachlin, Herbert S., Philadelphia, Pa.
Roney, Harry A., Philadelphia, Pa.
Rothman, Irwin, Philadelphia, Pa.
Savage, Wm. C. G., Philadelphia, Pa.
Schnautz, John O., Evansville, Ind.
Showalter, Charles L., Lexington, Va.
Schrader, John K., New Stanton, Pa.
Swail, Clark E., Parsons St., Colebrook, N. H.
Vansant, Henry A., Bristol, Pa.
Wiley, James R., Wellsboro, Pa.
Wolfe, Larry J., Crafton, Pa.

State College of Washington

First Year

Aasen, Stephen W., Arago, Ore.
Adams, Carroll, Olympia, Wash.
Ament, Roland W., Billings, Mont.
Anderson, Mack, White Water, Mont.
Andrist, Charles G., Spokane, Wash.
Bell, Leland J., Woodland, Calif.
Bradbury, LeRoy G., Spokane, Wash.
Burke, Henry A., Tacoma, Wash.
Cambell, Lewis J., Seattle, Wash.
Clarke, William James, Seattle, Wash.
Cooper, Harvey R., Ardenvoir, Wash.

Dodge, John R., Olympia, Wash.
DuBois, Howard S., Kent, Wash.
Ellis, Raymond O., Auburn, Wash.
Ewing, William J., Mount Vernon, Wash.
Fortmann, Eberhard, Frederic, Wis.
Gaw, LaMar H., Seattle, Wash.
Hansell, William H., Athena, Ore.
Hardesty, Jack E., Spangle, Wash.
Hare, Carroll, San Fernando, Calif.
Hatfield, Doreen, Renton, Wash.
Hayward, Charles W., Spokane, Wash.
Herbert, Earl W., Spokane, Wash.
Kovach, Florain M., Tacoma, Wash.
Krebs, Walt J., Seattle, Wash.
Linder, Erick W., Tacoma, Wash.
Norman, Ted R., Portland, Ore.
Osebold, John W., Spokane, Wash.
Peterson, Harold, Dallas, Ore.
Pinckney, Bernard R., Hoquiam, Wash.
Rosenberg, Mervin, Los Angeles, Calif.
Ryncarz, Alex J., Tacoma, Wash.
Shumaker, Charles W., Kirkland, Wash.
Taylor, Ernest S., Yakima, Wash.
Vernon, Raymond G., Tacoma, Wash.
Walden, Richard T., San Jose, Calif.
Walker, Johnnie D., Los Angeles, Calif.
Wallace, Leighton E., Snohomish, Wash.
Zimmerman, James A., Spokane, Wash.

Second Year

Baker, Bart K., Los Angeles, Calif.
Beasley, Robert P., Whittier, Calif.
Bewley, Katherine M., Los Altos, Calif.
Boe, S. Luther, Battle Ground, Wash.
Brabrook, Robert K., Olympia, Wash.
Burch, Robert L., Seattle, Wash.
Button, Archie I., Kent, Wash.
Callahan, Burt F., Moscow, Idaho.
Cranston, Ray E., Rire, Wash.
Crowl, Walter B., Los Angeles, Calif.
Davis, Sanford E., Jefferson, Ore.
Duby, George D., Pullman, Wash.
Ferrucci, Vitt P., Seattle, Wash.
Francis, Jack L., Palmer, Wash.
Freiermuth, George J., Watsonville, Calif.
Garlick, Gordon K., Ferndale, Wash.
Geierman, Joseph L., Pullman, Wash.
Harris, William F., Pasco, Wash.
Haskell, Paul B., Portland, Ore.
Hinds, John L., Twisp, Wash.
Hinz, Earl F., Yakima, Wash.
Hoop, Jay D., Fresno, Calif.
Jenney, Edwin W., Turlock, Calif.
Jones, Marlowe H., Altadena, Calif.
Lewis, Robert V., Spokane, Wash.
MacKintosh, Roderick G., Yakima, Wash.
Menig, Otto, Four Lakes, Wash.
Newhall, Jay H., Spokane, Wash.
Peterson, Ivan A., Forks, Wash.
Piamondon, Ralph J., Tumwater, Wash.
Piatt, Caroline, San Mateo, Calif.
Potts, Burt E., Pullman, Wash.
Ripley, Herbert R., Beverly Hills, Calif.
Seghetti, Lee, Eatonville, Wash.
Sheehan, John, Renton, Wash.
Thornfeldt, Robert E., Deer Lodge, Mont.
Townsend, William H., Great Falls, Mont.
Van Hoosen, Nyles W., Yakima, Wash.
Webb, Gene C., Clatskanie, Ore.

Third Year

Adams, Raymond S., Olympia, Wash.
Ashton, Willard H., Salt Lake City, Utah
Baldwin, Earl M., Helena, Mont.
Beck, Robert A., Modesto, Calif.
Chisholm, William W., Tacoma, Wash.
Christenson, Luther B., Pullman, Wash.
Cook, Albert T., Clarkston, Wash.
Eakin, Lawrence F., Corvallis, Ore.
Estrem, Calvin R., Auburn, Wash.
Eville, Thomas B., Santa Monica, Calif.
Fast, Robert R., Ritzville, Wash.
Ferguson, Donald E., Pullman, Wash.
Foster, Stuart M., Arcata, Calif.
Giambroni, Joseph E., Oakland, Calif.
Graff, Virgil E., Spokane, Wash.
Henig, Harold F., San Francisco, Calif.
Horsmann, Glen L., Pullman, Wash.
Janssen, Howard A., Alameda, Calif.
Jasper, Donald E., La Grande, Ore.
Jones, Francis P., Escondido, Calif.
Kadaner, Benjamin A., Seattle, Wash.
Koger, Lavon, Cove, Ore.
Konnerup, Nels, Granite Falls, Wash.
Lewis, Ray L., Medford, Ore.
Lind, Donald E., Portland, Ore.
Ludvigson, LaRue E., Los Angeles, Calif.
Luke, Harold F., Everett, Wash.
Merrick, William H., Pullman, Wash.
Metcalf, Fred L., Stevensville, Mont.
Morris, John R., San Francisco, Calif.
Moyer, Donald L., Edmonds, Wash.
Pike, Burton Francis, Long Beach, Calif.
Powers, Maxwell T., Roseburg, Ore.
Ritter, William L., Metaline Falls, Wash.
Schuehle, Walter A., Seattle, Wash.
Stahl, W. Edwin, Missoula, Mont.
Stone, Ernest C., McGill, Nev.
Warsinske, Harold E., Spokane, Wash.
White, Leslie C., Colfax, Wash.
Willis, Smith, Pullman, Wash.

Fourth Year

Abinanti, Francis R., San Francisco, Calif.
Bjork, Clifford A., San Luis Obispo, Calif.
Boero, Arthur J., Hayward, Calif.
Bowers, Frederick W., Victorville, Calif.
Bradbury, Ray H., Spokane, Wash.
Burns, Leslie, Los Angeles, Calif.
Bynum, Robert N., Ellensburg, Wash.
Carter, Leland B., Gresham, Ore.
Clarke, Don W., Spokane, Wash.
Conner, Gabel H., Sprague, Wash.
DeMattei, John D., San Jose, Calif.
Devine, Kenneth D., Redwood, Calif.
Donnelly, Robert N., San Pedro, Calif.
Forsythe, Helen L., Portland, Ore.
Garlick, Norman L., Tacoma, Wash.
Glaisyer, R. Allington, Tacoma, Wash.
Groves, Newell P., Los Angeles, Calif.
Herr, Frank M., Wenatchee, Wash.
Hopkins, Glenn, Spokane, Wash.
Humphrey, Wedon F., Santa Maria, Calif.
Jeppesen, Lindy, Burlingame, Calif.
Jones, Dallen H., Oakland, Ore.
Kraft, James C., Cornelius, Ore.
Lewis, Robert F., Buttonwillow, Calif.
Lindenmayer, John E., San Francisco, Calif.
Lloyd, Andrew D., Walla Walla, Wash.
McGill, Delbert A., Fall City, Wash.
McNary, David C., Ingram, Pgh., Penn.
Marlowe, Paul C., Kent, Wash.
Nordlund, Cecil A., Tacoma, Wash.
O'Connell, Jim P., San Diego, Calif.
Petersen, William M., Fowler, Calif.
Powers, Percy A., Pullman, Wash.
Rockwell, William, Pullman, Wash.
Septon, Leif A., Tacoma, Wash.
Snyder, Leo B., Pierce, Idaho.
Storey, Raymond C., Enumclaw, Wash.
Thorning, William M., Redwood City, Calif.
Tuomy, George F., Van Nuys, Calif.
Vennigerholz, Philip, Lewiston, Idaho.
Walker, Robert H., Livermore, Calif.
Wanner, Kasper W., Willmar, Minn.
Worcester, William W., Hollywood, Calif.

Kansas State College

First Year

Alm, Austin G.
Anderson, Eugene E.
Bardshar, Edward
Berg, Leo G.
Bowers, Don R.
Brecheisen, Adell W.
Brown, Floyd E.
Buchli, Richard I.
Burns, John R.
Campbell, Robert D.
Coffman, Roger B.
Cook, Raymond H.
Dietrich, Melvin L.
Foelschow, Leslie O.
Gatzoulis, Paul W.
Guilfoil, Joseph E. V.
Harris, Warren G.
Henrikson, Keith D.
Hineman, Kalo A.
Hineman, Richard E.
Hoins, John H.
Holler, Orvin H.
Isaacson, Lloyd L.
Jackson, S. Lester
Jamison, William C.
Kershner, Russell L.
Lumb, William V.
McClurkin, Arlan W.
McDonald, Terrence E.
McMahan, Willard L.
Meredith, William H.
Miesse, William B.
Minnis, Russell G.
Mitchell, Kenneth P.
Mohney, Leonard W.
Moody, Robert B.
Oberst, Fayne H.
Ogilvie, Fred B.
Olney, Richard
Penticuff, Clarence M., Jr.
Poppenhouse, Robert L.
Porter, Henry D.
Porter, John J.
Pyles, Robert L.
Reeve, Marshall P.
Riling, John L.
Rockhold, Merrill D.
Rondeau, Hautesse E.
Shane, Charles K.
Splitter, Earl J.
Stonebraker, Ernest K.
Thies, William M.
Vacura, Gordon W.
Wempe, Leo R.
Weber, Howard O.
White, Wilbur W.
Wilson, Amos
Wissman, Robert G.
Zimmerman, Kenneth C.

Second Year

Atkinson, George W.
Beckenhauer, Neil D.
Bender, Henry A.
Beyler, Clifford D.
Burkert, Lester H.
Busset, Burson G.
Campbell, Thomas C.
Coates, Albert S.
Dietrich, LeRoy E.
Donahue, Dennis R.
Elliott, William D.
Erickson, Robert N.
Gory, Peter E.
Gregory, David W.
Griffiths, Clayton B., Jr.
Gurss, Gerald
Handel, Robert T.
Hentzler, Robert W.
Hervey, James S.
Hostetler, Clarence B.
Kimbell, Kenneth E. C.
Knoche, Ralph W.
Ludwig, Nolan A.
Lunt, Donald W.
Messer, Ralph L.
Mills, Carroll R.
Montgomery, Earl L.
Morris, Olin W.
Myers, Bill J.
Nelson, Robert K.
Newman, John P.
Robb, Arthur D.
Ruf, Jess Wayne
Sebree, Lorrain O.
Sheehey, Max S.
Short, George E.
Simic, William J.
Smith, Richard W.
Spencer, Ralph N.
Stoddard, Edward D.
Swenson, Melvin J.
Symns, Jay C.
Tennery, John H.
Thomas, Roy C.
Trimble, Monte M.
Upham, Roy W.
Webb, Lowell M.
Whiteman, Charles E.
Wilkins, Lysle M.
Winters, Buford D.
Worthman, Robert P.

Third Year

Ahrendes, Francis G.
Appleton, Wayne L.
Ball, Maurice
Berner, Waldemar T.
Blazier, Ralph W.
Bright, Cruger L.
Bright, James E.
Brite, Allen L.
Bruce, Ralph A.
Cady, Jack D.
Callaway, Hugh P.
Case, Arthur A.
Christian, Donald K.
Dalziel, George T.
Daseler, William E.
Downey, Keith W.
Dillenbeck, George E.
Edrington, Leslie R.
Fieser, John E.
Fox, Jack E.
Garrett, John P.
Gaston, William S.
Gorman, Richard J.
Gould, Kenneth M.
Hall, Freeman M.
Hauke, Robert E.
Hickman, George
Jeppesen, Quentin E.
Johnson, William P.
Kirk, Arthur D.
Knox, James W.
Lank, Robert B.
Liebengood, Don M.
Linn, Leland L.
Love, Clarence A.
McDonald, Edward J. P.
McRae, Roderick E.
Mahler, Edward J.
Meinecke, Orval H.
Middleton, Kenneth B.
Mossman, Robert C.
Nelson, Conrad L.
Prasnikar, Anthony J.
Ratliff, DeVere F.
Reynolds, Jay
Shambaugh, Ben, Jr.
Shea, Richard A.
Siegel, Ernest A.
Steele, Floyd O.
Voelker, Carl J.
Walker, Frederic B., Jr.
Watson, Bruce C.
Weiner, Bernard M.
Wempe, William W.
West, Roger

Fourth Year

Armstrong, Fernando E.
Armstrong, George R.
Atkinson, Leroy N.
Bain, Lawrence R.
Betts, James G.
Bowerman, William D.
Brower, Arthur W.
Bruce, Kenneth L.
Busby, Bernard
Carl, Gilbert W.
Chambers, Edward E.
Clark, Robert H.
Collins, Clark C.
Davis, Shirley L.
Dedrick, Warren J.
Duncan, Glenn E.
Eberhart, George W.
Erickson, John E.
Eyestone, Willard H.
Flipse, Frank A.
Gish, John G.
Halver, Glenn C.
Howell, Gordon C.
Howell, Herbert W.
Immenschuh, Robert D.
Jones, Charles F.
Kadets, Martin
Karnes, Jacob L.
Keller, Edward J.
Kelley, Virgil R.
Kennedy, Charles A.
Koger, Richard B.
Laird, Glover W.
Lemen, Clifford A.
Lichlyter, Frank E.
McMahan, V. Keith
McPeek, Raymond C.
Manley, David O.
Medaris, Jack L.
Meriweather, Bert
Mundell, Earl L.
Newhart, Charles C.
Paulsen, Cecil L.
Payne, Loyal C.
Pierce, LeRoy A.
Port, Rodney I.
Prather, Elwin R.
Reed, Myron D.
Renfrow, Charles D.
Schendel, Samuel A.
Smith, Charles C.
Smith, Charles L.
Stanzel, Raymond W.
Stitt, Marvin D.
Swart, Richard W.
Thompson, Clarence H., Jr.
Toynton, Earl C.
Trostle, W. Gerald
Vanderbilt, William H.
Wendt, Delbert O.
Whitney, Don O.

Texas A & M College

First Year

Anderson, A. A.
Anderson, G. R.
Bailey, E. G.
Bailey, J. W.
Baker, F. W.
Ballard, D. C.
Barnes, J. M.
Barron, C. N.
Beckley, D. E.
Black, W. L., Jr.
Bott, A. R.
Baronti, A. C.
Buie, J. R.
Bunch, G. D.
Cabeen, J.
Case, J. N.
Casey, W. M.
Clark, A. J.
Clayton, P. A.
Cline, D. T.
Cory, R. J.
Crutcher, M. L., Jr.
Davie, Boyd F.
Denny, L. G.
Detjen, E. Y.
DeVolin, T. E.
Dobson, G. W.
Douglas, Frank J.
Dowell, P. H.
Driver, E. K.
DuBose, W. G.
Duckenfield, H.
Dugan, G.
Dunphy, R. G.
Elia, C.
Fahr, R. E.
Fischer, G. W.
Flowers, R. E.
Fuller, E. W.
Gordon, T. M.
Gray, J., Jr.
Gunn, F. L.
Hagler, J. H.
Hancock, S. E.
Harner, G.
Hejl, J. M.
Holbrook, L. C.
Holmes, H. D.
Hornechel, E. P.
Hurst, H. L.
Jenkins, W. D.
Johnson, J. E.
Johnson, S. N.
Joiner, E. E.
Kaltwasser, A. C.
Kelber, W. J.
Kerby, D. R.
Klusmire, Wm. F.
Linam, D. D.
McCoy, Kid
Madin, S. H.
Magee, R. C.
Magrane, H. J.
Milentz, A. R.
Miller, R. H.
Munson, A. H.
Nicholson, K. J.
Partin, L. W.
Pelot, William L.
Phillips, H. M.
Phillips, W. A.
Raley, A. C.
Rigler, L. C.
Roberson, B. C.
Romane, W. M.
Rosenfeld, Jerome
Rouse, H. D.
Schofield, G. C.
Sealy, R. O.
Shelton, W. L.
Smith, A. W.
Smith, E. F.
Smith, H. R.
Snodgrass, T. B.
Spencer, E. T.
Stallings, E. P.
Stenzel, R. W.
Streetman, E. G.
Tannahill, C. F.
Tennison, L. B., Jr.
Tischler, H.
Titsworth, R. M.
Toro, E. E.
Tower, J. H.
Ward, R. D.
Winne, J. A., Jr.
Winters, R. W.
Young, J. B.

Second Year

Aaron, Edward
Aldridge, Wm. G.
Alldredge, B. E.
Belcher, W. A.
Benitez, S. P.
Borer, L. N.
Bornstein, S.
Brown, R. D.
Cartrite, H. T.
Chastain, C. B.
Clyatt, B. W.
Coffey, Thomas H.
Crippen, D. A.
Culpepper, A. R.
Curran, P.
Darst, Joseph F.
De Lucia, K. J.
Dickmann, H. W.
Donelson, S. B.
Droleskey, A. H.
Dwelle, E. D.
Eder, A. S.
Ewald, P. J.
Glenn, D. M.
Grimes, G. M.
Grissam, G. J.
Grossman, A.
Haight, R. H.
Hancock, R. M.
Hargis, G.
Hauser, W. E.
Hayden, J. G.
Hays, J. C.
Hensler, H. L., Jr.
Hoffer, S. H.
Hull, J. S., Jr.
James, H. P.
James, P. M.
Jhnatowicz, A. E.
Jones, C. K.
Lacey, L. T.
Lang, J. T.
Lapham, R. F.
Lichnovsky, J. F.
Lichty, D. L.
Liggin, S. J.
Macy, R. D.
Maier, M. E.
Marcello, C. J.
Martin, G. A.
Matheney, R. G.
Morgan, Clyde O.
Morin, R. L.
Muller, G. H.
Mynatt, V.
McCollum, B. B.
Nayovitz, B. W.
Ommert, W. D.
Parker, C. W.
Parker, G. W.
Patterson, R. C.
Pickard, A. M.
Pinkerton, J. T.
Pugatch, N.
Rea, T.
Rinehart, J. O.
Rogers, W. T.
Saunders, D. H.
Schwartz, C. L.
Schwarzenbach, H. F.
Schweda, J. C.
Smothers, D. D.
Sparkman, C. M.
Staggs, H.
Stevens, E. H.
Stocking, R. A.
Sturkie, H. N.
Sturtevant, R. A.
Thomas, J. H.
Thomas, W. K.
Thompson, C. F.
Tierce, M. L.
Tubbs, C. R.
Vogelman, I.
Walker, H. H.
Walker, W. W.
Zellers, E. G.

Third Year

Bandy, D. M.
Bennett, R. W.
Bertetta, G. P.
Bird, V. W.
Blum, I. P.
Boney, W. A.
Brown, R. H.
Caldwell, F. H.
Caraway, R. B.
Crayton, R. B.
Dewey, W. W.
Dunnet, D. C.
Echegaray, J. A.
Fishman, A. D.
Foshee, R. J.
Flynn, R. M.
Grennan, T. J.
Henry, P. R.
Herrera, L. B.
Hobert, E. S.
Hunt, J. N.
Isaac, V. C.
Kagan, M.
Kessler, S. M.
Kreuz, S. S.
Leathers, R. B.
Lepon, E. L.
Locke, R. F.
Lopez, O. A.
Lutz, H. H.
McBride, M., Jr.
McCoy, J. W.
McDonald, S. A.
McKinney, H. R.
Merritt, W. W.
Michaels, V. W.
Miller, A. A.
Mohr, C. A.
Moughon, B. C.
Mueller, G. L., Jr.
Norton, R. R.
Ota, M.
Paley, K. J.
Penwell, P. H.
Regenbogen, M.
Roberts, C. B.
Roberts, M. P.
Sall, I. E.

Sanders, O. M.
Shalkop, W. T.
Shanzer, H.
Wilcoxon, J. D.
Wolf, J. W.

Fourth Year

Adams, G. B.
Allen, J. W.
Appleby, A.
Banks, W. C.
Barron, H. T.
Baumgarten, A. M.
Bernkrandt, A.
Bernkrandt, L.
Bogen, S.
Borer, M. H.
Brock, G. A.
Burrus, M. M.
Carter, R. W.
Carver, H. E.
Castro, F. E.
Castleberry, M. W.
Curts, K. M.
Davidson, H. E.
Davis, R. H.
Demke, D. D.
Droleskey, E. A.
Einhorn, R. W.
Faust, H. R.
Fortson, T. E.
Franklin, T. E.
Garrett, R. G.
Greenlee, H.
Gutnecht, A. J.
Harris, T. O.
Haywood, J. B.
Helfand, M.
Horne, C. H.
Huggins, J. D.
Ingram, H. E.
Inman, M. L.
Kirby, T. C.
Kirkham, W. W.
Larson, K. E.
Larson, W. W.
Levy, George
Linn, A.
Logie, A. J.
Lopp, H.
Marcia, A. F.
Mark, I. C.
Mash, N.
Melman, H.
Millar, J. T.
Miller, H. D.
Mostyn, H. B.
Nathan, W. R.
Nickerson, W.
Pessin, S. M.
Porter, W. M.
Radeleff, R. D.
Rehkemper, J. A.
Romo, R. R.
Saunders, J. R.
Schmidt, H. A.
Schmidt, H. J.
Schulberg, H. L.
Simels, M. G.
Sova, P. P.
Stalheim, O. H.
Stallworth, G. D.
Stein, P. D.
Tomayko, Val
Toro, E.
Tucker, B. B.
Walker, J. W.
Watkins, R. R.
Willey, C. R.
Zahn, C. W.

Equine Influenza a Virus Disease

Even before virus diseases of animals were actually classified as such, experimental inoculations of blood drawn from affected horses were found to produce a febrile reaction with the usual depression, anorexia and edema of the limbs and eyes characteristic of uncomplicated shipping fever. The work of Dieckerhoff, Poels, Luhrs, Gaffky, Scout, and others cited in the literature proved that blood free of figured organisms is virulent. But little follow-up work, however, was done through succeeding years to make practical use of knowledge these old authors acquired. The World War (No. 1) did not enrich our knowledge in any respect, notwithstanding the tremendous toll influenza took in dead and disabled horses and mules during that international conflict, not to mention the excellent opportunity there was to do some large-scale research work. "Guinea pigs" were not lacking. Stockyards and remount depots here and abroad could have furnished an unlimited number of experimental animals. England, France, Italy and the United States, as well as South American countries where remounts were purchased in large numbers, all failed to develop a worthwhile prophylactic measure.

Todd and Soutar[1] found that 5-cc. injections of germ-free blood drawn from influenza-affected horses produced typical reactions.

The latest work proving the existence of a transmissible virus in the blood of affected horses was that of Dale and Dollahite[2] of the U. S. Bureau of Animal Industry, who in 1939 reproduced equine influenza in experimental horses with injections of blood serum taken from influenza cases in New England.

The main reason for bringing up this question at this time and place is the preparation for national defense now under way, and the despair influenza of horses and mules is going to cause unless some practical method of handling this plague of animal transportation is discovered.

If you have sore feet you may consult a chiropodist, orthropedist, technopedist, podiatrist, practipedist, orthropedic surgeon, orthropraxist, or just a foot specialist. The fee will run between $5.00 and $200.00.

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[1]Todd, A. G., and Soutar, J. J. M.: Proc. 13th Int. Vet. Cong., ii (1938), p. 1202.

[2]Dale, C. N., and Dollahite, J. W.: Experimental transmission of equine influenza. J.A.V.M.A., xcv (1939), 752, pp. 534-535.

THE NEWS

AVMA Activities

Information on the Dog-Food-Testing Program*

1) **Why was the dog-food-testing program of the American Animal Hospital Association undertaken?** Because of a growing realization by veterinarians in the late '20s and early '30s that an increasing amount of canine morbidity and mortality was nutritional in origin and frequently associated with the exclusive feeding of prepared dog foods of inferior nutritive quality.

2) **When was the program started?** First consideration was given to this undertaking prior to the meeting of the International Veterinary Congress in New York City in 1934. The appointment of a Committee on Foods was officially approved at the St. Louis meeting of the AAHA in 1936.

3) **Who were the members of the first Committee on Foods?** M. L. Morris, chairman, New Brunswick, N. J.; J. V. Lacroix, Evanston, Ill.; and Charles W. Bower, Topeka, Kan. The appointments were for a period of five years. At the Washington meeting of the AAHA in 1938, Dr. Lacroix found it necessary to tender his resignation and J. Raymond Currey, Washington, D. C., was appointed in his place.

4) **Following the appointment of the Committee, what was the first undertaking?** The coöperation of recognized authorities in the science of nutrition was sought and five such qualified experts were enlisted to constitute an Advisory Scientific Council. This Council undertook the responsibility for the scientific soundness of the test procedures to be drawn up. A tentative plan of testing dog foods was then prepared, which, when finally revised and adopted by the Council and the Committee on Foods, was submitted to some 230 manufacturers of dog foods.

5) **What is the function of the Advisory Scientific Council and of whom does it consist?** The Council serves in an advisory capacity to the Committee on Foods. It is the function of the members of this Council to review the test and retest data under code number and prepare an authoritative opinion on the findings with the recommendation that the food be accepted, rejected, or improved and retested. Likewise, any problem involving a technical question on chemical or biological assays or the approval of certain label or advertising claims is referred to them for their study and advice. The final decision, however, rests with the Committee on Foods. At present this Council consists of the following: George R. Cowgill, School of Medicine, Yale University; H. H. Mitchell, Division of Animal Nutrition, University of Illinois; Agnes Fay Morgan, Department of Home Economics, University of California; R. A. Dutcher, Department of Agricultural and Biological Chemistry, Pennsylvania State College; and Walter C. Russell, Department of Agricultural Bio-Chemistry, Rutgers University.

6) **Why were members of the Advisory Scientific Council selected from the field of biochemistry rather than from the field of veterinary science?** The science of nutrition has advanced so rapidly in recent years and is so highly specialized today that studies to determine accurately the food value of any given product require training in chemistry, biochemistry and nutrition which few veterinarians, physicians or dentists possess, and are not even expected to acquire in their regular curricula. The fact that persons especially qualified in the technical and research phases of nutrition were selected to advise the Committee on Foods is no reflection upon veterinarians or veterinary science because chemical and biological assays of dog-food products constitute a technical responsibility that should not be assumed by veterinarians alone in establishing a sound program of this kind. For example, the federal bureau of animal industry, although primarily concerned with questions of animal-disease control of a veterinary nature, employs many persons especially trained in other basic sciences to conduct certain phases of its routine and research work.

7) **How many manufacturers have made inquiry regarding tests on their products?** About one hundred.

*Prepared by the Committee on Foods, American Animal Hospital Association, and the Special Committee of the Executive Board on Dog-Food Testing, American Veterinary Medical Association; presented as Exhibit "F" of the report of the Special Committee at the 77th annual meeting of the AVMA, Washington, D. C., August 26-30, 1940. (See page 403, October 1940 issue of the JOURNAL.)

8) What varieties of foods have been tested to date? Four canned and three dry foods.

9) When was the first test started and the first seal of approval issued? The first contract was signed and the testing started on April 14, 1937. The first seals were issued to the manufacturers on December 10, 1937.

10) How are samples obtained for testing? Products to be tested are purchased in the open market by the Committee, identifying labels removed and code numbers assigned. The samples are then sent to the testing laboratory for chemical and biological assays and to selected veterinarians for practical feeding tests.

11) What examinations are made on each product prior to issuing the seal of approval? At least three: a chemical analysis, a biological assay in which rats are used, and a practical feeding test on dogs.

12) Where are the examinations made? The chemical and biological assays are conducted for the Committee on Foods in a laboratory of its selection. At present, this work is being done at the University of Illinois.

13) Who actually tests the food? The chemical and biological rat assay tests are conducted under the personal direction of H. H. Mitchell, head of the Division of Animal Nutrition at the University of Illinois. The practical feeding tests are conducted by practicing veterinarians in various parts of the country all of whom are members of the AVMA and AAHA.

14) Is the AAHA's agreement for the testing of foods with the University of Illinois or with some private individual at the University? The agreement is with the University of Illinois, not with an individual.

15) What are the actual test methods employed at the University of Illinois? See description of method in *The North American Veterinarian*, Vol. 20, No. 10, October 1939, pp. 46-52.

16) How does a manufacturer proceed to submit his product for testing? The Committee on Foods provides a regular application form for this purpose.

17) How was the contract or agreement, referred to in the application form, prepared? Conferences were held with qualified representatives of various interested agencies, including large and small manufacturers of dog foods, kennel magazines and breed organizations. Then a tentative agreement for the testing of dogs foods was prepared by a qualified attorney and submitted to the AAHA for approval. This agreement has been amended from time to time as the result of discussions, criticisms and suggestions from various interested sources.

18) What is the approximate budget for the testing and approval of one canned dog food? Payable to the AAHA at the signing of the contract $500.00

Distribution of this fund is made approximately as follows:

Chemical and biological assay.....	$ 100.00	
Food purchased for chemical and biological analysis	10.00	
Remove labels, assign code numbers, repacking and express charges...	10.00	
Food purchased for practical feeding tests	30.00-	50.00
Remove labels, assign code numbers, repacking and express charges....	10.00-	15.00
Reserve for chemical and biological retests	100.00	
Purchasing and shipping food for retest	20.00	
Legal expense	50.00	
Council expense account.....	25.00	
Expense account of the Committee on Foods, for printing, postage, stationery, secretarial expense, telephone, etc.	80.00-	145.00
		$500.00

19) What is the approximate budget for the testing and approval of one dried dog food? Payable to the AAHA at the signing of the contract $500.00

Distribution of this fund is made approximately as follows:

Chemical and biological assay.....	$ 100.00	
Food purchased for chemical and biological analysis	5.00	
Remove labels, assign code numbers, repacking and express charges...	5.00	
Food purchased for practical feeding tests	45.00-	75.00
Remove labels, assign code numbers, repacking and express charges...	10.00-	20.00
Reserve for chemical and biological retests	100.00	
Purchasing and shipping food for retest	10.00	
Legal expense	50.00	
Council expense account.....	25.00	
Expense account of the Committee on Foods for printing, postage, stationery, secretarial expense, telephone, etc.	35.00-	125.00
		$500.00

20) The veterinary profession, animal owners and the purchasing public must be familiar with the seal of approval and that which it represents if the objectives of the program are to be understood. For this purpose the manufacturers have mutually agreed to contribute $450.00 per year per product to the AAHA for the publication of the official directory of approved foods and for such other educational material as the Committee on Foods finds it desirable to disseminate.

Budget for the publication of a directory of

approved foods and other educational information:

Amount received by the AAHA for one product of canned or dry food	$450.00

Present fixed expenses for space in journals and magazines for one product:

American Kennel Club	$240.00	
American Veterinary Medical Association	36.00	
North American Veterinarian	65.00	
Balance available for general educational work, *i. e.*, exhibits, leaflets, etc.	109.00	
		$450.00

21) **It has been suggested that no charge be made for the approval of foods. Would this be feasible or possible?** To carry on this work in a satisfactory and scientifically sound manner without charge to the manufacturer would involve a financial obligation which hardly seems reasonable or justifiable for organized veterinary groups to assume. There appears no logical or compelling reason why the veterinary profession should maintain a testing and control service for the dog-food industry without cost to that industry. It is not unusual for an industry to pay for tests required for official approval of its products. For instance, producers and distributors of vitamin D milks are required to pay for monthly bio-assays of these products made in officially sponsored laboratories.

"Acceptance" or "approval" seals granted by certain agencies without cost to the manufacturer of the product approved obviously can not involve as close scrutiny or careful testing as might be desirable. It is a much more complex and expensive undertaking to approve a food on the basis that it is a complete dietary for the average normal dog than it would be simply to say that a product is clean, wholesome and palatable.

22) **Following the issuing of the seal, is there any further testing done on the foods?** Yes, the foods are retested chemically and biologically each year and supervision is maintained.

23) **Have the foods been retested since the present seals of approval were issued?** Yes, all foods were completely retested in 1938, 1939 and 1940.

24) **How do the retest data compare with the originals? In other words, is the quality of the foods being maintained?** Examination of retest data indicates that all foods have maintained their original quality; in some instances the foods have been improved by the manufacturer without request from the Association.

25) **Does the AAHA publish the relative values of the products tested?** No, this, we feel, would be unfair discrimination and does not rightfully fall within the objectives of this project.

26) **What procedure is employed to assure the AAHA that the manufacturer is maintaining the quality of the food as originally tested?** Market samples are purchased each year, at periods unknown to the manufacturer, and subjected to retests in which both chemical and biological analyses are used. These data are again referred to the Council for comparison with those of the original seal-qualifying test. In addition, veterinary opinion of the foods tested is continually reaching the Committee's office and if any logical complaint is received, it is immediately investigated.

27) **What action is taken if a company submits a product that, upon test, fails to meet requirements?** In the case of a food tested and found nutritionally inadequate, and it being the desire of the manufacturer to improve the nutritional quality and have it further tested, the reasonable cost of such further testing shall be paid by the manufacturer, but in no instance shall the same exceed $200.00 for each such further testing.

28) **Suppose a manufacturer wishes to sell a very poor product and to make no particular claims for it, could such a food obtain the seal of approval?** No, because it would fail to meet the portion of the contract which provides: "Manufacturer agrees to comply with all rules and regulations now, or hereafter, promulgated by 'Approving Association,' or its duly constituted committee, as the same may operate to the proper control and completion of purposes hereof." Also, one of the rules and regulations is that the food must be a complete dietary for the average normal dog and must be able to produce growth. If it will do this, there is no question that it will provide for maintenance.

29) **Does the Committee on Foods recommend a chemical standard for dog foods?** No. This question has been given very lengthy and careful consideration by both the Committee and its Advisory Council; the best advice obtainable to date is that a fixed chemical standard should not be adopted, as yet.

30) **Should a "minimum standard" be adopted?** The adoption of a "minimum standard" so designed as to "shut out" inferior brands of dog foods has also been given careful consideration. The Committee and its Council do not recommend at this time that a minimum standard for dog foods be adopted by the veterinary profession.

31) **Who determines the criteria by which a food is acceptable for the seal of approval?** It is determined by the Committee on Foods,

all of whom are veterinarians, together with its Advisory Scientific Council.

32) Why does the seal read "tested and approved as represented on the container"? Since we are dealing with a complete dietary for a given species, it was finally decided that the seal be worded in this manner. The interpretation of this legend is as follows:

Tested means that market samples of the food have been subjected to chemical, biological and practical feeding tests.

Approved means that the results of the tests have been reviewed by a council of biochemists, nutritionists and veterinarians; that the food as tested is complete for growth and maintenance of the average normal dog; that it is under the legal supervision of the AAHA in coöperation with the AVMA and that the manufacturer has been officially authorized to use the seal of approval on the label or in advertising.

As represented on the container means that the label copy has been examined; that the statements which appear on the label are true and correct; that they do not misrepresent the nutritive value of the food; and that satisfactory evidence for the claims is on file in the office of the Committee on Foods.

33) When was the dog-food-testing program of the AAHA first called to the attention of the AVMA? At the Columbus meeting in 1936. The Section on Small Animals recommended the appointment of a committee to consider the matter. Later, the Executive Board designated one of its members, L. A. Merillat, to serve along with a committee from the small animal section (J. C. Flynn, A. R. Theobald and E. R. Blamey) in order to investigate and report back.

34) What action resulted? The Executive Board recommended, at the meeting in Omaha in 1937, that a Council on Foods be designated as a standing committee. After discussion of various aspects of the matter, the recommendation was laid on the table by the House of Representatives. See J.A.V.M.A., xci (Oct. 1937), pp. 476-478.

35) What preceded the submission of the proposed resolution providing for a coöperative understanding between the AVMA and the AAHA? The matter was carefully considered by the Executive Board from various angles. In addition, a request was received by the AVMA from the Institute of American Meat Packers under date of August 18, 1939, that action be taken whereby the AVMA would extend the privilege to manufacturers of dog foods to use the legend, "Approved by the AVMA," when such manufacturers complied with standards to be set by the AVMA.

Careful study of this proposal by the Executive Board indicated that it would be undesirable to adopt a separate program which might duplicate the AAHA program in many respects. Consequently, the Board recommended the resolution which was finally adopted by the House of Representatives at the Memphis meeting. See J.A.V.M.A., xcv (Oct. 1939), pp. 455-459.

36) Does the AVMA take any active part in helping to direct the policies of the dog-food-testing program? Yes. A special committee of the Executive Board was appointed at Memphis (O. V. Brumley, chairman, C. W. Bower and J. G. Hardenbergh). The duties of this committee are (1) to determine how the joint relationship may best be implemented; (2) to conduct further studies of the dog-food-testing situation; (3) to confer with the Institute of American Meat Packers re their proposal for AVMA approval of dog foods, and try to work out a program mutually satisfactory to all interests.

Several conferences have been held with various groups. As a result of one conference of the special committee and the Board of Governors with representatives of the Committee on Foods and the Advisory Scientific Council, the policies and procedures have been thoroughly reviewed for the purpose of getting wider application of the seal of approval. Progress is being made in this direction.

37) Can a manufacturer obtain the seal only by submitting his product for test to the AAHA? No. Instead, he may submit protocols of tests made by independent laboratories for review by the Committee on Foods and its advisory council. If found acceptable, the seal is granted on the basis of such satisfactory evidence.

38) Does such manufacturer pay the same fee as those whose foods are tested by the AAHA? No, a deduction of $150.00 is allowed.

39) If a manufacturer makes regular application for a test of his product, pays the fee of $500.00 at time of signing contract, and then decides to withdraw before testing has started, what happens? A refund of $450.00 is made; $50.00 is retained by the AAHA for preliminary expenses involved in the transaction.

40) Does the program duplicate the activities of the Federal Trade Commission or the Food and Drug Administration? No. Each of these agencies has an important place in dog-food commerce, but they do not undertake to test foods chemically, biologically and practically in a manner which would serve to identify them adequately for the purchaser. In this connection, the Committee on Foods recently filed a complaint with the Federal Trade Commission; months later it was advised that the

company in question was operating under the Packers and Stockyard Act; consequently, the Commission had no jurisdiction in the case. This particular company continues to sell a very questionable product and make unreasonable claims for it, claims which the Committee on Foods would never approve for a food bearing the seal of approval.

41) **What, if any, has been the effect of the program on the standards of all dog foods?** Considerable evidence indicates that the program has encouraged the production of better dog foods and discouraged the manufacture and sale of nutritionally inferior foods. Some manufacturers have provided for fellowships at universities; others have started their own control laboratories. There has also been improvement in published information concerning commercial dog foods; certain manufacturers who do not have the seal state that this project has done more to improve the quality of commercial dog foods than any other one thing that has been undertaken.

42) **Why does it seem desirable that the AVMA should coöperate in the seal of approval work?** For several reasons, including (1) a considerable body of veterinary opinion indicates the need of veterinary supervision of dog foods; (2) parts of the industry itself seek AVMA approval; (3) the AAHA already had a program believed to be workable and fundamentally sound and which is being improved as experience indicates the need; (4) separate approval of dog foods by two veterinary organizations is obviously undesirable; (5) an effort should be and is being made to correlate veterinary opinion so that the profession may present a united front and common program to the industrial interests who are seeking veterinary approval of their products.

43) **Has the coöperative project necessitated any undue expenditures on the part of the AVMA?** No. The Committee on Budget last year provided $200.00 to cover expenses of the special committee on dog-food testing.

44) **When the joint resolution was presented at Memphis, was the AAHA expected to provide a bond to protect the AVMA in the event of "legal involvement?"** No, the Executive Board made no such suggestion or request. The mention of a bond arose only during the discussion of the resolution in the House of Representatives and received no formal consideration or action by that body.

45) **Has there been any effort to suppress information concerning any phase of the program or of the coöperative relationship?** No. On the contrary, regular reports of the work of the Committee on Foods have appeared in considerable detail in published proceedings of the AAHA, numerous articles describing the work have appeared in veterinary journals, and reprints from *The North American Veterinarian* (March 1938) describing the testing and approval of dog foods have been widely distributed to veterinarians. A new booklet designed for distribution by veterinarians to their clients has been prepared. (See also list of references below.)

Any criticism as to "secrecy" about the coöperative relationship is unfounded.

46) **Have requests for information regarding the program of the coöperative relationship come to the Committee on Foods or to the special committee on dog-food testing from veterinary periodicals that have criticized the program?** No such requests have ever been received.

AAHA Committee on Foods

M. L. MORRIS, *Chairman*
C. W. BOWER
J. R. CURREY

AVMA Special Committee on Dog-Food Testing

O. V. BRUMLEY, *Chairman*
C. W. BOWER
J. G. HARDENBERGH

References

1) The seal of approval of the American Animal Hospital Association. No. Amer. Vet., xix (March 1938), pp. 46-50.

2) Mitchell, H. H.: Mineral tests in dog foods. Flour and Feed (June 1939).

3) *Ibid.*: The dog food testing program. No. Amer. Vet., xx (Oct. 1939), pp. 46-52.

4) Seal of approval foods. No. Amer. Vet., xx (Oct. 1939), pp. 53-59.

5) Mitchell, H. H.: Recent developments in canine nutrition. No. Amer. Vet., xx (Dec. 1939), pp. 24-29.

6) Report of the Committee on Foods. Proc. 4th Ann. Meet., Amer. Ani. Hosp. Assn., pp. 69-76.

7) Report of the Committee on Foods. Proc. 5th Ann. Meet., Amer. Ani. Hosp. Assn., pp. 43-52.

APPLICATIONS

Rules Concerning Applications for Membership (Quoted from the Administrative By-Laws):

Candidates for membership shall present an application to the executive secretary on a special form approved by the Board of Governors. The form shall state the applicant's race, name, age, education, year of graduating and work in which he is engaged. It shall contain the endorsement of two members, one of whom shall live in the same state, province or territory as the applicant.

Notice of all applications shall be published in the JOURNAL for two successive months. The first notice shall give the applicant's full name, year of graduation, post office address, and the names of his endorsers. The applicant shall be declared elected and so notified 30 days after

the second notice has been published, provided no objection to his election has been filed in writing. Objections to an applicant's election shall be subject to the action of the Executive Board. A rejected applicant may present his defense to the Executive Board through the House of Representatives.

First Listing

ALBRIGHT, ALANSON
Cayuga, Ind.
D.V.M., Terre Haute Veterinary College, 1917.
Vouchers: J. C. Schoenlaub and W. A. Sullivan.

ALLEN, BERTRAM V.
1220 Maumee Ave., Fort Wayne, Ind.
D.V.M., Iowa State College, 1934.
Vouchers: Edgar D. Wright and Geo. W. Gillie.

ANDREWS, J. R.
510 E. Main St., Ottawa, Ohio.
B.V.Sc., Ontario Veterinary College, 1938.
Vouchers: E. V. Hover and L. A. Merillat.

BERGMAN, R. H.
Madison, Minn.
D.V.M., Iowa State College, 1931.
Vouchers: John N. Campbell and L. A. Merillat.

BLAKELY, FRANKLIN C.
7 Central Place, Newburyport, Mass.
V.M.D., University of Pennsylvania, 1908.
Vouchers: H. W. Jakeman and C. Lawrence Blakely.

BRENNAN, JAMES A.
425 S. Main St., Gloversville, N. Y.
D.V.M., Cornell University, 1937.
Vouchers: Wm. Hagan and H. H. Dukes.

BURRISS, THEO. L.
Anderson, S. Car.
D.V.M., McKillip Veterinary College, 1917.
Vouchers: R. R. Salley and S. W. Haigler.

BURSTEIN, HAROLD
4148 Pennsgrove St., Philadelphia, Pa.
V.M.D., University of Pennsylvania, 1935.
Vouchers: Sidney A. Steiner and M. J. Maloney.

CARPENTER, M. Y.
621 Wells Parkway, Norfolk, Va.
B.V.Sc., Ontario Veterinary College, 1939.
Vouchers: A. J. Sipos and H. S. Miller.

CARROLL, FLOYD E.
508 S. 2nd St., Laramie, Wyo.
D.V.M., Kansas City Veterinary College, 1916.
Vouchers: H. D. Port and C. E. Burkholder.

COLE, HARRY L.
R. F. D. 7, Bay & Schust Rds., Saginaw, Mich.
D.V.M., Michigan State College, 1928.
Vouchers: H. J. Stafseth and E. S. Weisner.

CONE, M. J.
88 E. Housatonic St., Pittsfield, Mass.
V.S., Ontario Veterinary College, 1907.
Vouchers: L. A. Paquin and H. W. Jakeman.

CRAM, HERBERT C.
558 N. W. 43rd St., Miami, Fla.
D.V.M., Cincinnati Veterinary College, 1913.
Vouchers: Harold A. Krig and M. W. Emmel.

CURRY, JOSEPH M.
39 Hartland St., Hartford, Conn.
B.V.Sc., Ontario Veterinary College, 1910.
Vouchers: Geo. E. Corwin and J. Douglas Winn.

DEAN, R. F.
North Salem, Ind.
M.D.C., Chicago Veterinary College, 1906.
Vouchers: A. C. Spivey and J. L. Kixmiller.

DE MOTT, ANDRE R.
Utica St., De Ruyter, N. Y.
D.V.M., Cornell University, 1926.
Vouchers: H. J. Milks and H. C. Stephenson.

DERSHEM, GEORGE E.
Roann, Ind.
D.V.M., Michigan State College, 1938.
Vouchers: J. C. Schoenlaub and D. M. Smith.

DOWNING, RALPH R.
311 Range Lane, E. St. Louis, Ill.
D.V.M., Terre Haute Veterinary College, 1912.
Vouchers: W. B. Holmes and A. E. Dickerson.

DRAPER, ANDREW M.
1856 Post Rd., Fairfield, Conn.
D.V.M., Cornell University, 1938.
Vouchers: Geo. E. Corwin and J. Douglas Winn.

EVERSON, CLYDE L.
Live Stock Sanitary Service, College Park, Md.
D.V.M., Ohio State University, 1929.
Vouchers: Mark Welsh and A. L. Brueckner.

FINNEY, G. E.
Onancock, Va.
V.M.D., University of Pennsylvania, 1909.
Vouchers: A. J. Sipos and H. S. Miller.

FUNCHESS, L. C.
128 N. Mason St., Bowie, Texas.
D.V.M., Southwestern Veterinary College, 1916.
Vouchers: J. Gilbert Horning and L. A. Merillat.

GRAVES, COLBY
P. O. Box 26, Culpeper, Va.
D.V.M., Alabama Polytechnic Institute, 1935.
Vouchers: Samuel G. Eddins and Page M. Graves.

HINKLE, EARL S.
124 W. Main St., Centerville, Ind.
V.M.D., Indiana Veterinary College, 1909.
Vouchers: R. E. Kepner and Walter K. York.

HOSKINS, R. J.
3203 E. Washington St., Indianapolis, Ind.
D.V.M., Ohio State University, 1932.
Vouchers: C. C. Donelson and J. C. Schoenlaub.

JAMES, W. D.
114 N. Jackson, Greencastle, Ind.
D.V.M., Indiana Veterinary College, 1916.
Vouchers: J. L. Kixmiller and A. C. Spivey.

JONES, T. LLOYD
Veterinary Laboratory, Dept. of Agriculture, Edmonton, Alberta.
B.V.Sc., Ontario Veterinary College, 1934; M.Sc., McGill University, 1935.
Vouchers: P. R. Talbot and J. C. Hargrave.

KELLY, CROSBY
2924 Mills Ave. N. E., Washington, D. C.
D.V.M., U. S. College of Veterinary Surgeons, 1918.
Vouchers: A. E. Wight and William M. Mohler.

KENDALL, HUNTER E.
Route 1, Milstead, Ala.
D.V.M., Alabama Polytechnic Institute, 1938.
Vouchers: E. S. Winters and W. B. Castleberry.

LEONARD, T. W.
Newellton, La.
D.V.M., Alabama Polytechnic Institute, 1938.
Vouchers: J. C. Wright and I. S. McAdory.

LLOYD, SAMUEL E.
802 Genesee St., Buffalo, N. Y.
D.V.S., American Veterinary College, 1893.
Vouchers: Frank E. McClelland and L. A. Merillat.

LOCKRIDGE, F. R.
1010 W. Market St., Crawfordsville, Ind.
D.V.M., Indiana Veterinary College, 1921.
Vouchers: J. L. Kixmiller and A. C. Spivey.

LYNETT, J. F.
141 Jefferson Ave., Scranton, Pa.
V.M.D., University of Pennsylvania, 1909.
Vouchers: A. Henry Craige, Jr., and Louis A. Klein.

MICKELSEN, C. H.
1447 El Miradero St., Glendale, Calif.
D.V.M., State College of Washington, 1939.
Vouchers: Paul C. Lockhart and T. H. Agnew.

MIMS, LEE ROY
P. O. Box 183, Auburn, Ala.
D.V.M., Alabama Polytechnic Institute, 1932.
Vouchers: E. S. Winters and W. B. Castleberry.

OLBETER, RUDOLPH M.
Clayton, N. Mex.
V.S., New York College of Veterinary Surgeons, 1894.
Vouchers: T. I. Means and S. W. Wiest.

REA, H. CALVIN
P. O. Box 5264, Charlotte, N. Car.
B.S., North Carolina State College, 1916; D.V.M., Kansas City Veterinary College, 1918.
Vouchers: J. H. Brown and J. V. Lacroix.

REEDY, J. E.
Paso Robles, Calif.
D.V.M., San Francisco Veterinary College, 1912.
Vouchers: W. L. Curtis and B. B. White.

ROSE, C. E.
North Liberty, Ind.
V.S., Indiana Veterinary College, 1903.
Vouchers: J. C. Schoenlaub and W. A. Sullivan.

SCHWARTZ, J. A.
Danville, Ind.
D.V.M., Indiana Veterinary College, 1910.
Vouchers: J. L. Kixmiller and A. C. Spivey.

SCOTT, PAUL FRANKLIN
New Market, Ind.
D.V.M., Indiana Veterinary College, 1918.
Vouchers: A. C. Spivey and J. L. Kixmiller.

SHERMAN, LEONARD H.
50 N. Clinton Ave., Bay Shore, L. I., N. Y.
V.M.D., University of Pennsylvania, 1936.
Vouchers: Oscar Glueck and Edwin N. Foster.

SHIKLES, ERNEST A.
Dearborn, Mo.
M.D.C., Chicago Veterinary College, 1911.
Vouchers: H. W. Young and S. J. Schilling.

SMITH, WM. A.
Heron Lake, Minn.
B.V.Sc., Ontario Veterinary College, 1918.
Vouchers: John N. Campbell and L. A. Merillat.

SWALES, W. E.
Macdonald College P. O., Quebec.
B.V.Sc., Ontario Veterinary College, 1930; Ph.D., McGill University.
Vouchers: A. E. Cameron and L. A. Merillat.

TORRES, SYLVIO
Rua Ibituruna 12 Casa F, Rio de Janeiro, Brazil.
(At present located at Brazilian Embassy, Washington, D. C.)
D.M.V., National Veterinary College, Rio de Janeiro, 1919.
Vouchers: Harry W. Schoening and A. B. Crawford.

WINSLOW, JOSEPH H.
Box 52, La Moure, N. Dak.
D.V.M., Indiana Veterinary College, 1912.
Vouchers: Fred C. Driver and Frederik Low.

WISHARD, DELL E.
P. O. Box 692, Edinburg, Texas.
D.V.M., Indiana Veterinary College, 1911.
Vouchers: J. Gilbert Horning and A. J. McKee.

Second Listing

Anderson, John H. A., Monticello, Ind.
Booth, Frank R., Elkhart, Ind.
Carson, O. A., Royal Center, Ind.
Gootee, Leo M., Loogootee, Ind.
Hodson, C. P., 304 W. 12th St., Peru, Ind.
Horn, Wm. R., Topeka, Ind.
Huber, C. W., 515 W. Culbertson St., Fostoria, Ohio.
Johnson, J. E., 36 Erb St. E., Waterloo, Ont.
Kline, E. W., Thorntown, Ind.

Lagarde, R., 26 St. No. 359, Vedado, Havana, Cuba.

Leach, Daniel F., W. Barnstable Rd., Osterville, Mass.

McPhail, Joseph N., Morocco, Ind.

Merritt, W. E., 1130 S. 19th St., Fort Dodge, Iowa.

Munson, Todd O., Angell Memorial Animal Hospital, 180 Longwood Ave., Boston, Mass.

Myers, B. E., R. 3, Washington, Ind.

O'Keefe, Edward, 1635 N. Bond St., Saginaw, Mich.

Page, E. R., Corydon, Ind.

Pringle, E. G., Goshen, Ind.

Seeger, M. M., Thorntown, Ind.

Smith, R. L., Kentland, Ind.

Smith, Ray F., Boswell, Ind.

Spivey, A. C., Thorntown, Ind.

Walkey, Fred L., 459 Littleton St., West Lafayette, Ind.

Weaver, H. J., Hagerstown, Ind.

Wooldridge, E., Momence, Ill.

Yocom, E. J., Winamac, Ind.

Hendershott Appointed to Executive Board

R. A. Hendershott (O.S.U. '17) of Trenton, N. J., has been named by President Wight as Executive Board member for District 2 (Pennsylvania, New Jersey, Delaware, Maryland, District of Columbia), succeeding John G. Hardenbergh, who became executive secretary of the Association on January 1.

R. A. Hendershott

For the past three years Dr. Hendershott has been a prominent member of the House of Representatives and, since joining the Association in 1919, has served on a number of committees. He is at present a member of the special Committee on Bang's Disease.

Kinsley Laboratories Merges with The Corn States Serum Company

The Kinsley Laboratories, pioneer producer of veterinary biological products, has been taken over by The Corn States Serum Company and will be moved to Omaha, Neb., about March 1, or as soon as equipment can be installed. The laboratory will occupy elaborate space in the Corn States building at 1124 Harney St., Omaha.

The merging of these two laboratories recalls that The Kinsley Laboratories began operations as the A. T. Kinsley Laboratory in the basement of the Kansas City Veterinary College in 1908. Its life as a corporation began in 1913. When in 1918 larger quarters were needed to accommodate its expanding production, the laboratory and offices were moved to the New Center Building, and twelve years later (1930), for the same reason, to its present location, 1103 E. 47th St., Kansas City, Mo. As this laboratory has had 34 years of uninterrupted experience in the development and production of the widely used veterinary biological products, the joint announcement of Dr. Kinsley of the Kinsley Laboratories and of President G. H. Williams of The Corn States Serum Company is news of special interest to the veterinary profession. Ill health extending over a period of two years was the cause of Dr. Kinsley's retirement from the arduous work of the production field.

J. D. Ray (K.C.V.C. '17), director of the diagnostic and research laboratory of The Corn States Serum Company since 1934, who was formerly in charge of production for The Kinsley Laboratories, will be the laboratory director under the new ownership, and Charles Foulk (St. Jos. '21) and other members of the Kinsley staff will continue with the laboratory at its new location.

The Kinsley Laboratories developed the technic of volume production of many biological products and also new clinical uses of them largely through its diagnostic laboratory, which was always a feature of the institution. It likewise pioneered in the development of new products, such as homologous serum and antigen for canine distemper.

Dr. Kinsley received his degree of Bachelor of Science at Kansas State College in 1899 and his Master of Science degree at the same college in 1901. The latter was conferred for his studies in bacteriology. He was graduated from the Kansas City Veterinary College in 1904, and thereafter served his alma mater as professor of histology and pathology. In 1913, he was made president of the College and served in that rôle until it closed in 1918. During his college career, he added three excellent books to the literature, one on veterinary pathology and two on swine diseases which contributed richly to the education of Corn Belt veterinarians in that branch of clinical work. His editorial work in *Veterinary Medicine* on swine diseases and his many contributions to the programs of veterinary associations throughout the country, not to mention his keen interest in organized veterinary medicine, have had a wholesome effect on the advancement of veterinary science and practice. Dr. Kinsley is an honorary member of many associations, and besides serving the AVMA as president and

member of important committees, he represents his state in the House of Representatives.

Interviewed on the future of The Kinsley Laboratories, President Williams said: "In its new Omaha home, facilities of the approved pattern will be provided in the company's five-story fireproof building on Harney street, which is located near the business district, and there is extensive acreage at the serum-producing plant at 44th and U streets which will provide additional facilities when needed. It is our intention to continue the high standard characteristic of Kinsley products under the direction of Drs. Ray and Foulk, who received their training under Dr. Kinsley, and we are pleased to welcome the other members of the Kinsley staff to Omaha. It will broaden our service to graduate veterinarians, whom we have had the pleasure of serving for more than 25 years."

U. S. GOVERNMENT

Regular Army

Lt. Col. Oscar C. Schwalm is relieved from assignment and duty at Fort Des Moines, Iowa, effective on or about November 4, 1940, and assigned to duty at Camp Joseph T. Robinson, Ark.

Major John R. Ludwigs, retired, is placed on active duty, effective on or about November 15, 1940, and is assigned to the San Antonio General Depot.

Captain Karl H. Willers, now on temporary duty as a student at the Medical Field Service School, Carlisle Barracks, Pa., is relieved from assignment and duty at Fort Oglethorpe, Ga., effective upon completion of his present course of instruction at that school, on or about December 3, 1940, and is assigned to duty with the General Dispensary, U. S. Army, Washington, D. C., and to additional duty as attending veterinarian at Bolling Field, and Army War College, Washington, D. C.

Captain Frank A. Todd, now on temporary duty as a student at the Medical Field Service School, Carlisle Barracks, Pa., is relieved from assignment and duty at Fort Devens, Mass., effective upon completion of his present course of instruction at that school, on or about December 3, 1940, and is assigned to duty at Fort Belvoir, Va.

Captain Robert P. Kunnecke, retired, is placed on active duty, effective November 26, 1940, and is assigned to Fort Bliss, Texas.

Lt. Col. George W. Brower is relieved from assignment and duty at Fort Clark, Texas, effective on or about December 1, 1940, and is assigned to Camp Blanding, Fla.

Lt. Col. Louis G. Weisman is relieved from assignment and duty at Fort Ethan Allen, Vt., effective on or about December 1, 1940, and is assigned to duty at Fort George G. Meade, Md.

Col. Cleil B. Perkins is relieved from assignment and duty at Fort Benning, Ga., effective on or about December 15, 1940, and is assigned to Headquarters, Eighth Corps Area, Fort Sam Houston, Texas.

Captain Lloyd C. Tekse is relieved from his present assignment and duty at the Presidio of Monterey, Calif., and is assigned to the 11th Cavalry at that station.

Lt. Col. Harry E. Van Tuyl is relieved from assignment and duty at Fort Sheridan, Ill., effective on or about December 15, 1940, and assigned to Fort Custer, Mich., for duty.

Captain Robert H. Yager is relieved from duty at the Army Medical Center, Washington, D. C., effective upon completion of his present course of instruction at the Army Veterinary School on or about December 8, 1940, is then assigned to the Second Corps Area Laboratory, New York, N. Y., will proceed to Front Royal, Va., and report to the commanding officer, Front Royal Quartermaster Remount Depot, for temporary duty for a period of approximately three months. Upon completion of this temporary duty, he will proceed to New York, N. Y., and report for duty.

Veterinary Corps Reserve

The following officers of the Veterinary Corps Reserve, now on extended active duty at the stations indicated, are directed to proceed to Chicago, Ill., and report to the commanding officer, Chicago Quartermaster Depot, for temporary duty for a period of 30 days for the purpose of pursuing a course of instruction, commencing on November 25, 1940, in the inspection of meat, meat-food and dairy products, under the depot veterinarian. Upon completion of this temporary duty each of the officers indicated (first lieutenants unless otherwise indicated) will return to his proper station:

Robert O. Zimdahl, Orlando, Fla.

Gerald W. Holmberg, Fort Banks, Mass.

Lawrence W. Groves, Camp Edwards, Falmouth, Mass.

Frank W. Jordan, Fort Jackson, S. Car.

Burton C. Thomas, Fort Bragg, N. Car.

Harold L. Geick, Fort Snelling, Minn.

Clifford N. Decker, Fort Snelling, Minn.

Emil L. Koch, Fort Snelling, Minn.

Robert H. Hartman, Fort Sam Houston, Texas.

Henry Donelson, Fort Sam Houston, Texas.

Rolland O. Scott, Presidio of Monterey, Calif.

Ralph O. Anslow, Fort MacArthur, Calif.

Rowland W. Rushmore, Fort Benning, Ga.

John W. Vandeven, Hdq. 3rd C. A., Baltimore, Md.

Captain Arthur C. Jerstad, Fort George G. Meade, Md.

Richard A. Huebner, Aberdeen Proving Ground, Md.

Major Paul H. Reed, N. G., 41st Div., Camp Murray, Wash.

1st Lt. Elmer A. Maier is relieved from assignment and duty at Fort Sam Houston, Texas, effective on or about November 25, 1940, and is assigned to San Antonio General Depot.

1st Lt. Leslie C. Murphy is relieved from assignment and duty at the Chicago Quartermaster Depot, Chicago, Ill., effective on or about November 25, 1940, and assigned to Fort Benning, Ga.

1st Lt. Harold D. James, now on temporary duty at the Army Medical Center, Washington, D. C., is relieved from assignment and duty at Fort Hayes, Ohio, effective on or about December 8, 1940, and is assigned to duty at the Army Medical Center, Washington, D. C.

1st Lt. Ben Winchester is relieved from further assignment and duty at Baltimore, Md., effective November 21, 1940, on which date he will revert to inactive status.

1st Lt. John E. Craige, now on temporary duty at the Army Medical Center, Washington, D. C., is relieved from assignment and duty at the General Dispensary, U. S. Army, Philadelphia, Pa., and from temporary duty at the A.V.S., effective upon completion of the course of instruction, and assigned to duty at the station hospital, Fort Sam Houston, Texas.

The following veterinary reserve officers (all first lieutenants) were ordered to extended active duty by the War Department during the month of November and assigned to stations indicated:

Jack R. Knappenberger, Robinson Quartermaster Depot.

William J. Schuck, Jr., New York Port of Embarkation.

James K. Taylor, Carlisle Barracks, Pa.

Karl F. Steinbach, Army Medical Center, Washington, D. C.

Harold K. Miller, Carlisle Barracks, Pa.

Richard A. Huebner, Aberdeen Proving Ground, Md.

Robert William Cook, Chicago Q. M. Depot, Chicago, Ill.

Garrett H. McNay, Fort Reno, Okla.

NEW ACCEPTANCES—FIRST LIEUTENANTS

Lewis Ishaam Case, 3235 Main St., Hartford, Conn.

Jos. Geo. Feinberg, 508 Manteo St., Norfolk, Va.

Thomas Lawrence, P. O. Box 66, Smithtown Branch, L. I., N. Y.

BAI Transfers

George A. Ahrens from Chicago, Ill., to Henderson, Ky., in charge of meat inspection.

Emmet S. Bacon from Wichita, Kan., to Los Angeles, Calif., on meat inspection.

Mihaly Borsos from Jersey City, N. J., to Chicago, Ill., on meat inspection.

Arthur G. Beagle from Sioux Falls, S. Dak., to Lincoln, Neb., on hog-cholera control.

Bernard Goldis from Raleigh, N. Car., to Albany, N. Y., on meat inspection.

Ollie R. Grantham from New York, N. Y., to South St. Paul, Minn., on meat inspection.

Nathan H. Howlett from Albany, N. Y., to Montpelier, Vt., in charge of tuberculosis eradication.

Bernard Meyerowitz from Baltimore, Md., to Chicago, Ill., on meat inspection.

Edwin L. Miller from Charleston, W. Va., to Augusta, Maine, on tuberculosis eradication.

Francis A. Pickett from Newark, N. J., to Waterloo, Iowa, on meat inspection.

George T. Reaugh from Chicago, Ill., to Oklahoma City, Okla., on meat inspection.

Robert Richman from Atlanta, Ga., to Boston, Mass., on tuberculosis eradication.

Clifton L. Whittington from Chicago, Ill., to Waterloo, Iowa, on meat inspection.

Retirements.—Chester Hassell, New York, N. Y., October 31, 1940; Ralph E. Noyes, Henderson, Ky., October 31, 1940.

Henry A. Wallace Describes Function of a County Agent

STATE VETERINARIAN J. L. Axby of Indiana calls attention to the following letter, written by Secretary of Agriculture Wallace to Senator Minton of Indiana:

Hon. Sherman Minton
United States Senate.

June 20, 1940.

Dear Senator Minton:

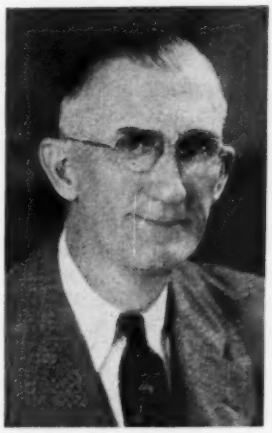
This is in further reference to your letter of May 14, 1940, enclosing a letter from Dr. J. L. Axby, State Veterinarian, State of Indiana, wherein Dr. Axby solicited your assistance in obtaining information "relative to the duties, status and scope of the activities of the County Agricultural Agents, as set out and in conformity with the Smith-Lever Act." You requested consideration of the matter in which Dr. Axby is interested.

The Smith-Lever Act, approved May 8, 1914 (38 Stat. 372), provides for coöperative agricultural extension work between the agricultural colleges in the several states receiving the benefits of the act of Congress approved July 2, 1862, "An Act donating public lands to the several States and Territories which may provide colleges for the benefit of agriculture and the mechanical arts," and acts supplementary thereto, and the United States Department of Agriculture. The act states that its purpose is "to aid in diffusing among the people of the United States useful and practical information on subjects relating to agriculture and

home economics, and to encourage the application of the same."

Agricultural extension work is broadly defined by the second section of the act, as follows: "That coöperative agricultural extension work shall consist of the giving of instruction and practical demonstrations in agriculture and home economics to persons not attending or resident in said colleges in the several communities, and imparting to such persons information on said subjects through field demonstrations, publications, and otherwise; and this work shall be carried on in such manner as may be mutually agreed upon by the Secretary of Agriculture and the State agricultural college or colleges receiving benefits of this act."

The act provides for the making of specified payments to the States which, by action of their legislatures, assent to the provisions of the act, and also for the payment of other annual sums to the State but upon the condition that no payment is to be made to a State until an equal sum is appropriated for the particular year by the legislature of such State or is provided by State, county or local authority or by the college or is made available by individual contributions from within the State, for the maintenance of the coöperative agricultural extension work provided for in the act. Authorizations were made for supplementary funds for agricultural extension work by the Capper-Ketcham Act of 1928 (45 Stat. 711) and by Title II of the Bankhead-Jones Act of 1935 (49 Stat. 438).



J. L. Axby

The only express limitations in the act concerning the use of the funds provided for therein are found in Section 5. This section limits the activities of the county agents by providing that no portion of the moneys shall be applied, directly or indirectly, in college-course teaching, lectures in colleges, promoting agricultural trains, or for any other purpose not specified in the act. The Capper-Ketcham Act, *supra*, provides that the additional sums appropriated shall be subject to the same conditions and limitations as the sums appropriated under the Smith-Lever Act and provides further, that "(1) at least 80 per centum of all appropriations under this act shall be utilized for the payment of salaries of extension agents in counties of the several States to further develop the coöperative extension system in agriculture and home economics with men, women, boys and girls; (2) funds available to the several States and the Territory of Hawaii under the terms of this act shall be so expended that the extension agents appointed under its provisions shall be men and women in fair and just proportions; (3) the restriction on the use of these funds for the promotion of agricultural trains shall not apply."

The Federal funds made available to the States pursuant to the statutory provisions previously referred to are combined with State or other funds of the college and are then allotted to the counties by the State extension officials. The county agricultural agents receive their compensation from these combined funds plus such other funds as are provided by or through the counties. The agents are jointly selected by the State extension office and the county coöperative groups. The Federal Extension Service does not take any authoritative part in the selection of the county agricultural agents. As a matter of practice, the names of the prospective county agents are submitted by the State officials to the Federal Extension Service for consideration and approval, but the States can appoint the agents without Federal approval. The county agents are employees of the States and not employees of the United States Government, although these agents are sometimes given Federal commissions which carry certain advantages, such as the privilege to use penalty envelopes.

As already noted, Section 2 of the Smith-Lever Act defines the coöperative agricultural extension work to be performed by the agents who are paid in part from the funds appropriated pursuant to the act. The activities and duties of such agents are extensive, and it is not feasible to include in this letter a detailed statement thereof. There are a number of publications, however, which give, in some detail, descriptions of the work performed by the agents. United States Department of Agriculture Miscellaneous Circular No. 59 describes county agricultural agent work under the Smith-Lever Act in 1914 and 1924 and gives a comparison of the work and problems covering this period. In reading this circular, it should be kept in mind that, since 1924, the duties of agents have been materially extended. Extension Service Circular No. 205, October 1934, contains a report of county agricultural agent work for 1933. A statement of the extension agent's position in the newer programs is made in Extension Service Circular No. 259, March 1937. A very interesting picture of a county agent's work is given in a reprint of an article which appeared in *Fortune Magazine* for July 1938. These pamphlets and circulars are enclosed, as is United States Department of Agriculture Miscellaneous Publication No. 285, September 1937, which contains the Federal

legislation, regulations, and rules affecting coöperative extension work in agriculture and home economics. This last-mentioned circular includes the Smith-Lever Act, the Capper-Ketcham Act, and the Bankhead-Jones Act, *supra*, together with other legislative acts, which, in general, affect the agricultural agent's work and activities.

It is also suggested that Dr. Axby may obtain additional information concerning the duties and activities of county agents from the following sources: *A History of Agricultural Extension Work, 1785-1923*, by Dr. Alfred C. True; *Agricultural Extension System of the United States*, by Dr. C. B. Smith and M. C. Wilson; *The County Agent and the Farm Bureau*, by M. C. Burritt; and *The County Agent*, by Gladys Baker. Copies of these publications should be available in any large library and in the libraries of the State agricultural colleges.

It is believed that the enclosures and the publications referred to in the preceding paragraph will give Dr. Axby a fairly complete statement of the duties and activities of the county agricultural agents. However, if Dr. Axby desires information relating to a particular duty or activity of a county agent, this Department will be pleased to furnish the same through you or directly to Dr. Axby. In addition, it is suggested that, as a very practical means of obtaining information, correspondence may be directed by Dr. Axby to the Director of Extension for any State in which he is interested. In the State of Indiana, correspondence should be directed to Dr. H. J. Read, Director of Extension, Purdue University, Lafayette, Indiana.

This Department has also received a direct request from Dr. Axby for the same information requested by you. We are advising Dr. Axby that we have written to you in detail in reply to your request, and that undoubtedly you will transmit this information to him in the near future. This Department will be pleased to render to you any additional assistance which you desire.

Sincerely yours,

(Signed) H. A. WALLACE,
Secretary.

Enclosures.

AMONG THE STATES

Alabama

The Southern Veterinary Medical Association met at Birmingham, November 13-15, with the largest attendance in its history.

A. A. Husman of Raleigh, N. Car., was elected president; J. C. Wright of Atlanta, Ga., president-elect; S. F. Stapleton of Americus, Ga., first vice-president; L. E. Beckham of Tuscaloosa, Ala., second vice-president; L. A. Mosher of Atlanta, Ga., secretary (reëlected); M. R. Blackstock of Spartanburg, S. Car., treasurer (reëlected); and R. R. Salley of Orangeburg, S. Car., and M. H. Dollar of Danville, Ky., directors.

Plans were made to hold the 1941 meeting in Jacksonville, Fla., in joint session with the Florida state association.

L. A. MOSHER, *Secretary.*

Arizona

On November 22-23, the Arizona Veterinary Medical Association convened at the Adams Hotel in Phoenix.

Officers elected for the ensuing year were G. G. Crosbie of Tucson, president; D. W. Miller of Phoenix, vice-president; and L. N. Butler of Phoenix, secretary-treasurer.

J. B. MCQUOWN, *Resident Sec'y.*

California

Dourine, protozoan disease of stallions and brood mares which was thought to be extinct in this country, is causing anxiety in the state livestock sanitary service owing to outbreaks in certain districts of Nevada and Arizona. In November, Governor Olson issued a proclamation prohibiting the importation of horses not duly certified as to their health.

Connecticut

The Connecticut Veterinary Medical Association held a meeting at the Hotel Garde in New Haven, November 6. Erwin Jungherr of the University of Connecticut at Storrs, Theodore Workman of Hartford and Edwin Laitinen of West Hartford contributed to the program.

GEO. E. CORWIN, *Secretary.*

Delaware

At the 35th annual meeting of the Eastern Guernsey Breeders Association, held at the Hotel du Pont in Wilmington, December 12, three prominent veterinarians contributed to the program: L. C. Ferguson of the University of Wisconsin, Madison, Wis., reported on his researches in blood character and its relation to identification of parents; Roger Amadon of the University of Pennsylvania, Philadelphia, Pa., spoke on acetonemia; and C. C. Palmer of the University of Delaware, Newark, presented a report on the Haskell research on mastitis for the year 1940.

Florida

During the month of November the Atlantic Coast Line Railroad, in coöperation with the

Florida State Department of Agriculture and the College of Agriculture of the University of Florida operated a livestock development train which was exhibited at 53 stations in 42 counties in the state. Displays covering forestry, agronomy, dairying, beef-cattle and hog production, parasites, and poultry were housed in four cars making up the exhibition portion of the train. The attendance was about 3,000 a day.

Veterinarians accompanying this train from time to time included C. D. Lowe, T. H. Applewhite, H. W. Willis and L. E. Swanson of the U. S. Department of Agriculture; J. V. Knapp, state veterinarian; V. L. Bruns, C. C. Brock, Ed Everett, Carl Owens and R. L. Brinkman, assistant state veterinarians; C. M. Pollard of Jacksonville; and A. L. Shealy, D. A. Sanders and M. W. Emmel of the University of Florida.

M. W. EMMEL, *Resident Sec'y.*

Illinois

The Northern Illinois Artificial Breeding Association, organized in December 1939 with a membership of 55, now has 174 members owning 1,286 animals. The Association's objective is 1,600 cows. J. W. Boller (Iowa '40) is the veterinarian in charge.

Iowa

At the 27th annual meeting of the Eastern Iowa Veterinary Association, Inc., held at the Hotel Montrose, Cedar Rapids, October 15-16, H. E. Tyner of New London was elected president. Jerry Wolfe of Grand Mound was named vice-president; R. E. Elson of Vinton, secretary; and A. R. Menary of Cedar Rapids, treasurer. S. G. Paul of Clarence was chosen to succeed A. R. Stephenson of Bennett on the board of trustees. Other trustees are C. A. Stewart of Tripoli and D. N. Voetberg of Traer.

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The 160,000 who attended the National Corn Husking Contest in Scott county in October is said to have been the largest peacetime gathering of all times.

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Thirty-eight veterinary practitioners and ten ladies attended the December ladies' night dinner meeting of the East Central Veterinary Medical Society at the Hotel Montrose, Cedar Rapids, December 12.

A Cedar Rapids dentist, C. L. Fenner, entertained with colored motion pictures taken on hunting expeditions.

Frank M. Wilson of Mechanicsville conducted a question box on shipping fever of feeder calves imported to farms and of home-raised cattle exposed by such importations. A. R. Menary of Cedar Rapids spoke on foot rot in feeder cattle.

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At the December 9 meeting of the Cedar Valley Veterinary Medical Society, held at Black's tea room in Waterloo, Lester Proctor of Hazleton gave a rousing talk on violations of Iowa laws enacted for the protection of livestock health. Following a lengthy discussion of his address a resolution was passed requesting State Secretary of Agriculture Mark G. Thornburg to employ an agent with legal training and experience to investigate infractions of the health laws for live stock and bring prosecutions wherever evidence can be obtained.

John Shoeman of Dallas Center gave a paper on "The Possibilities of Poultry Practice" and B. Rosenfeld of Osage spoke on erysipelas and enteritis of swine.

Maine

Maine veterinarians honored A. L. Hirleman (Cin. '03) of Augusta at a dinner at the Worster House in Hallowell, November 30, on the occasion of his retirement from the U. S. Bureau of Animal Industry after 45 years of service. P. R. Baird acted as toastmaster.

Massachusetts

E. A. Woelffer (Corn. '31) of Melrose, president of the Certified Milk Producers Association, presided over the Certified Milk Section of the International Association of Retail Milk Dealers, which was convened at Atlantic City, N. J., in October.

Mississippi

Says the *Jackson* (Miss.) *Clarion:* "The Mississippi Livestock Sanitary Board will maintain its quarantine on Louisiana cattle regardless of appeals from Louisiana officials to Governor Johnson and other officials of the state until such time as the board is satisfied there will be no reinfestation of ticks from Louisiana."

New Jersey

More than 150 guests were present at a dinner given November 26 in honor of John G. Hardenbergh on the occasion of his resigning as director of laboratories for the Walker-Gordon Laboratory Company, Inc., at Plainsboro, to accept the executive secretaryship of the American Veterinary Medical Association, effective January 1. The dinner was held at the Trenton Country Club in Trenton under the sponsorship of the Veterinary Medical Association of New Jersey.

Among those present were prominent agriculturalists, veterinarians of New Jersey and

adjoining states, and persons associated with Dr. Hardenbergh during his 13 years of service with the Walker-Gordon organization.

On behalf of the veterinarians of New Jersey and out-of-state friends, G. H. Kimnach of Hightstown, president of the state association, presented Dr. Hardenbergh with a desk set and traveling bags. Mrs. Hardenbergh also was given gifts by the Association. Following the dinner program Mrs. John H. McNeil, president of the Ladies' Auxiliary, gave a farewell gift to Mrs. Hardenbergh from the Auxiliary.

The committee in charge of arrangements comprised Chairman R. A. Hendershott, Samuel Coane, Clarence B. Johnston, John T. McGrann and J. R. Porteus, all of Trenton; G. H. Kimnach, and James M. Herron of Bordentown.

Several days prior to this affair, President Kimnach; and James M. Herron of Bordentown. unexpired term of Dr. Hardenbergh as secretary of the state association, an office held by the latter for nine consecutive years.

J. R. PORTEUS, *Resident Sec'y.*

New York

The Artificial Breeding Association of Ontario and Yates Counties was founded in November with 75 members owning 600 Holsteins and Guernseys. D. W. Pulver (Corn. '35) of Phelps is the veterinarian in charge.

There are 15 other associations of this kind in the state.

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A regular meeting of the Veterinary Medical Association of New York City was held at the Hotel New Yorker in New York City, November 6.

J. B. Engle of Summit, N. J., presided and introduced the guest speaker, Ralph W. G. Wyckoff of Lederle Laboratories, Inc., at Pearl River, who talked on the production and testing of potent rabies vaccine. A discussion of the technic, use and effects of the experiments followed Dr. Wyckoff's presentation.

Jacob Antelyes gave a report on "An Unusual Case of Pus in the Maxillary Antrum." Then, President Engle introduced Cassius Way, past president of the national association, who spoke briefly on the policies and work of the AVMA.

J. J. MERENDA, *Secretary.*

North Carolina

State Commissioner of Agriculture W. Kerr Scott has taken steps to regulate stock sales in North Carolina inasmuch as an increased number of places are operating with the consequent spread of various diseases. A conference has been held with the operators of sales yards, practicing veterinarians and the state veterinarian's office and regulations are being formulated satisfactory to all parties concerned.

J. H. BROWN, *Resident Sec'y.*

Rhode Island

During the spring and summer months of 1940 a Chicago biological laboratory established a distributing depot in Massachusetts and started to advertise their products in farm papers and pamphlets with instructions on the use of equine encephalomyelitis vaccine and rabies vaccine in syringe containers.

Later, the firm appointed agents in Rhode Island to sell and distribute biological products, with the result that the state board of veterinarians compelled several agents to be present at a hearing.

Another large biological laboratory carried advertisements in the daily press offering to furnish trained agents to assist and instruct poultrymen in the use of chicken vaccine.

The state veterinary board has held several conferences in regard to this situation and is determined to change the practice act during the coming legislative season so that prosecution of parties operating against the welfare of the veterinary profession can be facilitated. Further appeal will be made to the federal bureau of animal industry to revoke the license of any biological laboratory selling to anyone other than a licensed graduate veterinarian.

J. S. BARBER, *Resident Sec'y.*

Tennessee

Nine outbreaks of hog cholera in six counties were reported during the month of November by the state veterinarian's office. Also, there were nine outbreaks of erysipelas in nine counties, one outbreak of hemorrhagic septicemia and four of blackleg.

Texas

In the "25 Years Ago" column of *The Cattleman* (November 1940), the following item appears: "Dr. R. P. Marsteller (now dean) of the Texas A & M College discussed contagious abortion as 'One of the Common Diseases of Livestock.'"

Wisconsin

The North Central Wisconsin Veterinary Medical Association held a meeting and clinic at Eau Claire, December 11, with about 65 in attendance. G. B. Wrigglesworth was host to the group.

James S. Healy acted as toastmaster and V. S. Larson gave a report on the United States Live Stock Sanitary Association meeting held in Chicago the first week of December.

An election of officers was held and S. K.

Andreassen of Menomonie, Wis., was chosen president.

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On December 12 the Southwestern Wisconsin Veterinary Medical Association met at the Warren Hotel in Baraboo. The officers of this group are R. B. Hipenbecker of Fennimore, president, and C. W. Burch of Platteville, secretary.

A luncheon was held at the hotel and R. C. Finkle of Seymour provided the entertainment. V. S. Larson and James S. Healy of Madison and L. E. Willey of Sioux City, Iowa, were the speakers. Educational films were shown at the close of the session.

JAMES S. HEALY, *Resident Sec'y.*

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A new building for a control veterinary laboratory of the state department of agriculture was opened November 7, just west of the farm buildings on the University of Wisconsin campus. The principal activity of the laboratory will be to test cattle for brucellosis.

STUDENT CHAPTER ACTIVITIES

Kansas State College

On the evening of October 22, the eligible members of the freshman class were initiated. Following the meeting, during which various faculty members spoke, cider and doughnuts were served.

At the meeting of November 12, Charles Jones, a senior student from Lisbon, N. Y., addressed the group. The guest speaker was Lt. Col. George L. Caldwell of the Veterinary Corps, Fort Riley, who spoke on the selective service act and its bearing on veterinary students. He also related historical facts as to the number of officers, men and animals used in the last war, comparing them with the number apt to be used in the event of another conflict.

November 26, the chapter and faculty members with their "dates" and wives attended the annual fall veterinary dance, called the Javmarack, held at the Avalon ballroom in Manhattan.

WARREN J. DEDRICK, *Secretary.*

Iowa State College

A meeting of the Iowa chapter was held on October 16. The program consisted of a few short stories by Kent Magruder and an address on the relationship of the veterinarian to the cattle feeder by I. J. Kleaveland, a general practitioner of Sioux Rapids. Following, a one-act play was given by the senior class.

A committee on education was appointed by President Beardmore consisting of George Lightcap and Frank Bartley as senior class members; Art Gathman, junior class; Herbert Marsh, sophomore class; and Durwood Baker, freshman class.

A dance committee also was appointed by President Beardmore. Gerald Fehl was named chairman, with George Keller and Carl Norden as his associates.

Another meeting was held on November 6 in the judging pavilion of Iowa State College, where Harry Linn, assistant secretary of agriculture of the State of Iowa, gave a demonstration on restraint of horses. Next, Kent Magruder introduced Johnny Carpenter of Waterloo, drummer of the College band, who played several selections on the drums.

Motion pictures on equine encephalomyelitis and the life cycle of the wood tick were shown at the meeting of November 12.

R. BOYD SAWYER, *Secretary.*

Michigan State College

The student chapter of Michigan State College is now publishing a quarterly "veterinary science-college news" magazine, *M. S. C. Veterinarian.* L. Alvin Fahlund is editor, Paul C. Brown is business manager and C. F. Cairy (Iowa '36), faculty adviser.

Dean Giltner

The subscription price is $1 per year; single copies are 35 cents.

In the first issue, published in November, attention is called to the inauguration of a special feature, the "roll of honor," dedicated to the recognition of meritorious service. Each issue will announce an alumnus or friend of Michigan State College who has been selected by a student-faculty committee for this honor. His name will be inscribed on the Roll of Honor which will hang in the Junior AVMA office in the new clinic building and he will receive a small facsimile of the same.

Dean Giltner was the first to be thus recognized. The announcement was made with appropriate ceremony at a banquet given by the student chapter in the East Lansing Masonic Temple. R. A. McIntosh of the Ontario Veterinary College delivered the principal address. Other speakers were President Dykema and Secretary Schubel of the state association.

COMING MEETINGS

Dallas-Fort Worth Veterinary Medical Society. Dallas, Texas. January 2, 1941. R. L. Rogers, Jr., secretary, Route 2, Gordon, Texas.

Houston Veterinary Association. Houston, Texas. January 2, 1941. W. T. Hufnall, secretary, 1612-14 E. Alabama Ave., Houston, Texas.

New York City, Veterinary Medical Association of. Hotel New Yorker, New York, N. Y. January 2, 1941 (tentative). J. J. Merenda, secretary, 136 W. 53rd St., New York, N. Y.

St. Louis District Veterinary Medical Association. 7800 Olive St. Rd., St. Louis, Mo. January 3, 1941. J. P. Torrey, secretary, 555 N. 14th St., East St. Louis, Ill.

California Veterinary Conference (under joint sponsorship of California State Veterinary Medical Association and University of California). Davis, Calif. January 6-8, 1941. Further information may be secured from C. M. Haring, Division of Veterinary Science, University of California, Berkeley, Calif.

Small Animal Hospital Association. Los Angeles, Calif. January 7, 1941. W. K. Riddell, secretary, 3233 W. Florence Ave., Los Angeles, Calif.

University of Pennsylvania Conference for Veterinarians. University of Pennsylvania, Philadelphia, Pa. January 7-8, 1941. G. A. Dick, dean, School of Veterinary Medicine, University of Pennsylvania, Philadelphia, Pa.

Maine Veterinary Medical Association. Dr. M. E. Maddocks' hospital, Augusta, Maine. January 8, 1941. J. F. Witter, secretary, University of Maine, Orono, Maine.

Oregon State Veterinary Medical Association. Forest Grove, Ore. January 8, 1941. T. Robert Phelps, secretary, 1514 Washington St., Oregon City, Ore.

Southeastern Michigan Veterinary Medical Association. Medical Arts Bldg., 3919 John R St., Detroit, Mich. January 8, 1941. F. D. Egan, secretary, 17422 Woodward Ave., Detroit, Mich.

Kansas Veterinary Medical Association. Kansas State College, Manhattan, Kan. January 8-9, 1941. Charles W. Bower, secretary, 1128 Kansas Ave., Topeka, Kan.

Wisconsin Veterinary Medical Association. Park Hotel, Madison, Wis. January 8-9, 1941. B. A. Beach, secretary, University of Wisconsin, Madison, Wis.

Cornell University Annual Conference for Veterinarians. New York State Veterinary College, Ithaca, N. Y. January 8-10, 1941. W. A. Hagan, dean, New York State Veterinary College, Ithaca, N. Y.

Ohio State Veterinary Medical Association. Deshler-Wallick Hotel, Columbus, Ohio. January 8-10, 1941. R. E. Rebrassier, secretary, The Ohio State University, Columbus, Ohio.

Ak-Sar-Ben Veterinary Medical Association. Fontenelle Hotel, Omaha, Neb. January 13, 1941. J. D. Ray, secretary, 1124 Harney St., Omaha, Neb.

Oklahoma Veterinary Medical Association. Skirvin Hotel, Oklahoma City, Okla. January 13-14, 1941. F. Y. S. Moore, secretary, Box 485, McAlester, Okla.

Intermountain Livestock Sanitary Association. Newhouse Hotel, Salt Lake City, Utah. January 13-15, 1941. W. H. Hendricks, secretary, 1419 E. 17th South St., Salt Lake City, Utah.

Chicago Veterinary Medical Association. Hotel Sherman, Chicago, Ill. January 14, 1941. G. S. Elwood, secretary, 5449 Broadway, Chicago, Ill.

Indiana Veterinary Medical Association. Hotel Severin, Indianapolis, Ind. January 14-16, 1941. Chas. C. Dobson, secretary, New Augusta, Ind.

Southern California Veterinary Medical Association. Chamber of Commerce Bldg., Los Angeles, Calif. January 15, 1941. Charles Eastman, secretary, 725 S. Vancouver Ave., Los Angeles, Calif.

New Jersey, The Veterinary Medical Association of. Hotel Hildebrecht, Trenton, N. J. January 15-16, 1941. J. R. Porteus, secretary, P. O. Box 938, Trenton, N. J.

Kansas City Veterinary Medical Association. Kansas City, Mo. January 20, 1941. S. J. Schilling, secretary, Box 167, Kansas City, Mo.

San Diego County Veterinary Medical Association. Zoölogical Research Bldg., Balboa Park, San Diego, Calif. January 20, 1941. Paul D. DeLay, secretary, State Poultry Pathological Laboratory, Balboa Park, San Diego, Calif.

Tennessee Veterinary Medical Association. Noel Hotel, Nashville, Tenn. January 20-21, 1941. A. C. Topmiller, secretary, 530 W. Main St., Murfreesboro, Tenn.

District of Columbia Veterinary Medical Association. Mayflower Hotel, Washington, D. C. January 21, 1941. Wm. M. Mohler, secretary, 5508 Nebraska Ave., N. W., Washington, D. C.

South Carolina Association of Veterinarians. Wade Hampton Hotel, Columbia, S. Car. January 21, 1941. R. A. Mays, secretary, 415 State Office Bldg., Columbia, S. Car.

Keystone Veterinary Medical Association. School of Veterinary Medicine, University of Pennsylvania, Philadelphia, Pa. January 22, 1941. A. Henry Craige, Jr., secretary, University of Pennsylvania, Philadelphia, Pa.

Massachusetts Veterinary Association. Hotel Westminster, Boston, Mass. January 22, 1941. H. W. Jakeman, secretary, 44 Bromfield St., Boston, Mass.

Illinois State Veterinary Medical Association. Springfield, Ill. January 23-24, 1941. C. C. Hastings, secretary, Williamsville, Ill.

Michigan State College Post-Graduate Conference for Veterinarians. Michigan State College, East Lansing, Mich. January 27-February 1, 1941. Ward Giltner, dean, Division of Veterinary Science, Michigan State College, East Lansing, Mich.

North Carolina State College Annual Conference for Veterinarians. North Carolina State College, Raleigh, N. Car. January 28-31, 1941. Information may be obtained from C. D. Grinnells, North Carolina State College, Raleigh, N. Car.

Ontario Veterinary Association. Royal York Hotel, Toronto, Ont. January 30-31, 1941. W. J. Rumney, secretary, 612 King St., W., Hamilton, Ont.

Connecticut Veterinary Medical Association. Hartford, Conn. February 5, 1941. George E. Corwin, secretary, Room 285 State Office Bldg., Hartford, Conn.

Missouri Short Course for Graduate Veterinarians. Columbia, Mo. February 11-13, 1940. J. L. Wells, secretary, 1817 Holmes St., Kansas City, Mo.

State Board Examinations

Connecticut Board of Veterinary Registration and Examination. Hartford, Conn. January 7, 1941. Geo. E. Corwin, secretary, Room 285 State Office Bldg., Hartford, Conn.

Maine State Board of Veterinary Examiners. January 13, 1941. Further information may be obtained from the secretary, S. W. Stiles, Falmouth Foreside, Maine.

Kansas Board of Veterinary Examiners. Topeka, Kan. January 14, 1941. Further information may be obtained from Thos. B. Crispell, secretary, Exchange Bldg., Parsons, Kan.

Oklahoma Board of Veterinary Medical Examiners. State Capitol Bldg., Oklahoma City, Okla. January 15-16, 1941. W. C. McConnell, secretary, Box 88, Holdenville, Okla.

South Carolina State Board of Veterinary Examiners. Columbia, S. Car. January 21, 1941. Further information may be obtained from W. A. Barnette, secretary, Greenwood, S. Car.

PERSONAL NOTES

O. A. Meyer (Chi. '11) of Alton, Ill., addressed the Wood River (Ill.) Rotary Club recently on the care of horses and their value in military operations.

H. Schreck (Ind. '16) of El Paso, Texas, lost a case of surgical instruments and a 45-caliber automatic pistol a short time ago through thievery.

Edward H. Lenheim (St. J. '16) who practiced for many years at Burlingame, Kan., and more recently was associated with the federal bureau of animal industry, has located for practice in Lyndon, Kan.

Victor Van Wagenen (Corn. '37), is now associated with the Columbus Veterinary Hospital operated by Drs. Bleeker and Roberts of Columbus, Wis.

DEATHS

Warren L. Thayer of Worcester, Mass., died at the age of 67 on December 13, 1940.

Dr. Thayer was born in Greenfield, Mass., in 1871 and was graduated from McGill University in 1897. He joined the AVMA in 1916.

Frank Jelen of Omaha, Neb., retired BAI veterinarian, died of a cerebral hemorrhage on December 2, 1940.

Dr. Jelen was born in New York, N. Y., December 3, 1869, and was graduated from the Kansas City Veterinary College in 1905. He joined the Association in 1907.

Among his survivors are two sons: Frank A. Jelen (K.C.V.C. '17), state veterinarian of Nebraska, and George D. Jelen (O.S.U. '23), BAI inspector in charge of meat inspection at Pittsburgh, Pa.

G. L. Mackey of Bedford, Va., died on November 10, 1940, after a brief illness.

Dr. Mackey was born at Lexington, Va., April 11, 1889, and was graduated from the Chicago Veterinary College in 1915. He joined the AVMA in 1940.

G. D. Anderson, mayor of Torrington, Wyo., since 1938, died at the age of 47 on November 21, 1940.

Born in Wilsonville, Neb., July 11, 1893, Dr.

Anderson was graduated from the Kansas City Veterinary College in 1917. He joined the Association in 1919.

Hugh C. Dillon of Marion Junction, Ala., died on October 1, 1940.

Dr. Dillon, an employé of the federal bureau of animal industry, was graduated from Alabama Polytechnic Institute in 1934 and joined the Association in 1940.

E. A. Buxton, 79, of Vinton, Iowa, died of a heart attack on November 15, 1940, while making a professional call.

Dr. Buxton was born on May 20, 1861, in Forest, Wis., and was graduated from the Chicago Veterinary College in 1890.

Swine Erysipelas (Erysipeloid) in 1891

Surgical Bacteriology by N. Senn, published in March 1891, described swine erysipelas in man as follows:

It attacks usually the fingers and exposed parts of the hand, and is most frequently met with in persons who handle game or dead animals, as cooks, butchers, fish dealers and tanners. The affection starts from some minute abrasion of the skin, as a bluish-red infiltration which slowly advances in the proximal direction. While the skin at the point of infection returns to its normal condition and color, the zone of infiltration becomes larger as it continues to spread until the disease appears to exhaust itself in the course of from one to three weeks. . . . The disease travels very slowly, so that if the infection takes place in the tip of the finger, it reaches the metacarpus in about eight days, and during the next eight days it spreads over the back of the hand, from where an adjacent finger may become infected, the infection then taking a direction opposite to the lymph current. . . . During all this time the general health remains unimpaired, and the temperature varied from 98.2° to 99° F. . . . A microscopic examination showed swarms of irregular, round, elongated bodies larger than the staphylococci. . . . Older cultures resembled those of mice septicemia.

The author, who was a distinguished Chicago surgeon, mentioned that Rosenbach had cultured the organism on gelatin in 1886. It is, therefore, clear that the disease of swine, discussed at length from the human health side at the Washington session of the AVMA (1940), was known as a human infection in this country 50 years ago.

Colonial Veterinary Services

Speaking before the British Medical Association (April 1939), Wm. C. Miller, M.R.C.V.S., F.E.S.E., of the Royal Veterinary College of London said among other things:

The work [of the veterinary profession] has gradually developed from the control of the major devastating epizoötics which formerly brought famine and havoc in their trail, through stages of investigation and control of more local diseases, until now progressive colonies are pursuing an active policy of improvement of live stock by the encouragement of proper systems of grazing, conservation of forage and other crops for use during drouths and periods of shortage, improved methods of management, breed selection, use of important sires for grading of scrub stock, and better processing of meat and milk products. The whole of this work must be under constant expert supervision so that the reactions of stock to differing environmental conditions can be watched and any necessary measures immediately taken, and so that epizoötics, which are still liable to recrudesce, may be controlled and eradicated promptly and efficiently. . ."

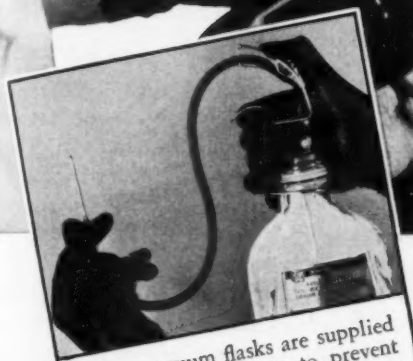
Meat Inspection

From a study made of animals slaughtered for food in the United States without any supervision, Koen* estimated that about 160,000 carcasses of these uninspected animals were not fit for human consumption. The number of animals slaughtered without inspection was given as 30 million. It was also pointed out that the slaughtering of that number of animals without any inspection demotes the disease-control program of the regulatory officials because meat inspection besides removing unfit food from the channels of trade is a means of locating foci of infection.

Veterinary associations in several states which have started movements to enlighten the public in this connection should be aided by the national association in their efforts to have meat-inspection laws enacted and thus forge this missing link of the veterinary service.

*Koen, J. S.: Some Phases of Meat Inspection. Proceedings, 42nd Annual Meeting of the United States Live Stock Sanitary Association (1938), pp. 116-122.

After the needle is inserted in donor's jugular the valve is opened — and the high vacuum, under which the flask has been sealed at the Cutter Laboratories, sucks the desired amount of blood into the flask.



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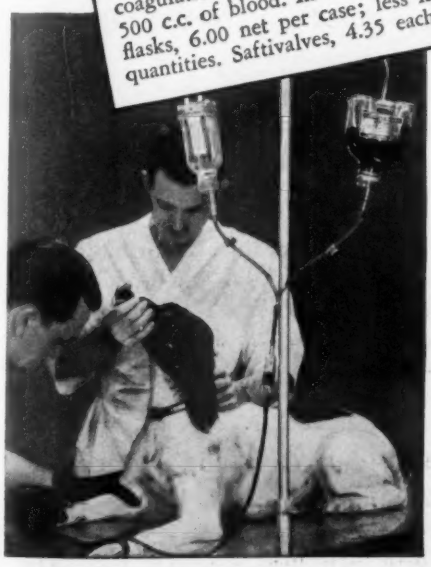

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LITERATURE UPON REQUEST

*Trade Mark Reg. U. S. Pat. Off. Word "Perandren" identifies the product as testosterone propionate of Ciba's manufacture. Available through usual trade channels.

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An' Related Topics

War May Curtail Shipments of Monkeys to U. S.

Industrial and Engineering Chemistry warns medical science that a serious shortage of monkeys is imminent in the United States because of a curtailment of their importation from British India. Ship-space shortage and other war restrictions necessitate the curb. The publication points out that only one out of every seven or eight monkeys imported here is used for show purposes, all the others being used for scientific projects—principally in the testing of new drugs.

"Turkish Bath" Incubator for Chicken Eggs

The American Society of Agricultural Engineers, convened recently at the Stevens Hotel in Chicago, heard Santiago R. Cruz, agricultural experimentalist, tell of an adaptation of the Turkish bath for incubating chicken eggs.

Cruz said that he applied heat to chicken eggs by placing electrodes in a fluid having the property of maintaining a constant temperature in the receptacle which holds the eggs and supplying the right amount of moisture and oxygen. The effect is similar to that produced by a Turkish bath.

New Michigan Law Protects Owners of Valuable Dogs

The State of Michigan has passed a law, designed to protect owners of valuable show and hunting dogs against theft, requiring registration and identification of dogs. The animals are tatooed on the inside of one ear. The new law imposes penalties upon persons harboring stolen registered dogs or attempting to eradicate the identification numbers.

The "Black and White" of Farming

"Here it is in black and white," says the Chicago *Tribune* in a story about the Black and White farm near Elkhorn, Wis., where

(*Continued on page xviii*)

Effective CHEMOTHERAPEUTIC AGENT *with high* SAFETY *factor*

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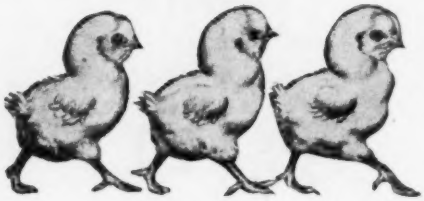

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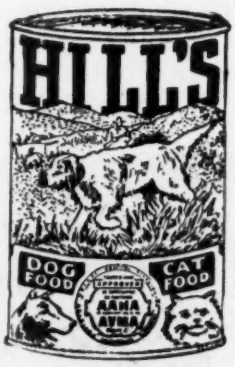

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An' Related Topics

(*Continued from page xvi*)

the animals, the house, the barn and the fences are all black and white.

The pigs are Poland Chinas, black and white. The Dutch belted cows are black with a white belt. The dogs are black and the cats are white. The guinea hens are black and white, the chickens are white Wyandottes and black Sumatras, and there are white turkeys as well as black ones.

The Golden Fleece of Rumania

When Rumanian customs officers became suspicious of blood on a flock of sheep being taken from Rumania into Dobruja, now part of Bulgaria, by some Bulgarian peasants, they investigated and found that the animals' hides had been incised, gold inserted beneath the skin and the cuts stitched up. Gold bells were fastened about the neck of some of the sheep while others harbored gold pieces in their long wool. The peasants were arrested.

Epidemics and Bombs

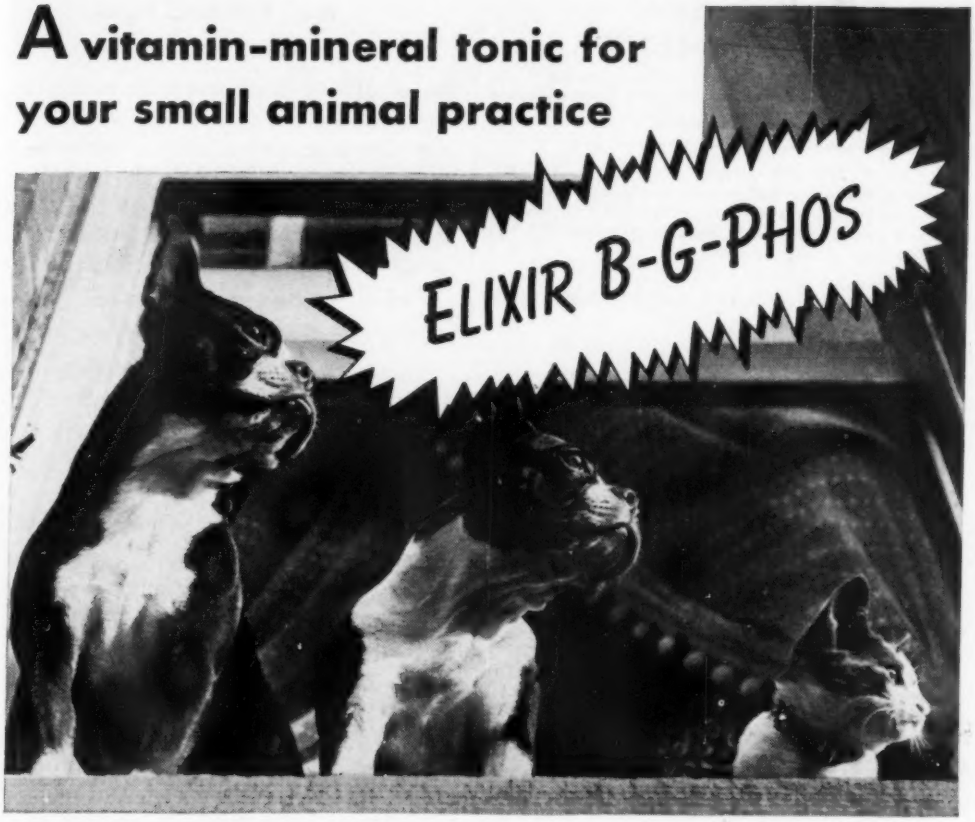
In regard to precautions against disease in the air-raid shelters, the London correspondent to *The Journal of the American Medical Association* warns that the greatest danger may not be bombs and parachutes, but germs of influenza and other infectious diseases. Large crowds sleeping night after night in air-raid shelters are apt to become the source of epidemics that will be difficult to control. Fortunately, sulfapyridine will be a great aid in reducing the mortality, the reporter assures.

Award in Endocrinology

E. R. Squibb & Sons have founded an annual award of $1,000 for the research worker of the United States or Canada who writes the best article on the subject of hormones during the calendar year. The merits of the contribution will be judged by the Association for the Study of Internal Secretions. The prize may be divided among two or more persons according to

(*Continued on page xx*)

A vitamin-mineral tonic for your small animal practice



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Calcium Glycerophosphate	2 gr.
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Potassium Glycerophosphate	⅜ gr.
Manganese Glycerophosphate	¼ gr.
Alcohol	17%

Supplied in pints and gallons

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SMALL ANIMAL hospital in large eastern city wants recent graduate as assistant on staff. Address: "DD," c/o Journal of the AVMA, 600 S. Michigan Ave., Chicago, Ill.

An' Related Topics

(*Continued from page xviii*)

the wishes of the awarding committee and the contribution may cover work done during previous years. The committee will receive nominations for the award up to January 15. In addition to the monetary award, the Association will present a simple scroll to the recipient as a momento.

Killing the Goose That . . .

Due to the scarcity of foodstuffs for poultry, Britain is now issuing ration cards to poultry owners, placing all fowls on a restricted diet.

Liberty Magazine on Military Medicine

The nickel magazine, *Liberty*, through its medical-minded publisher, Bernarr Macfadden, says a lot about a lot of things, but like the columns covering the whole field of human knowledge and work often do, it misses the nail badly in telling the world that soldiers eat too much and work too little, if not also in advising the War Department to employ the neuropaths, osteopaths and chiropractors to guard the

(*Continued on page xxii*)

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American Animal Hospital Asso.
In cooperation with
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An' Related Topics

(*Continued from page xx*)

soldiers' health, on the ground that these groups of medicists made a wonderful record during the World War. The latter we can trust the medical profession and World War records to answer, but in regard to work and chow of the soldier at war or training, recollection of the *queues* and rolling kitchens after ten-mile hikes appears to show that the swivel chair can be overtaken with crazy ideas that are both unfair and dangerous in times like these. The man who says that soldiers do not work and have too much to eat has never been *there*. He is just talking to amuse the uninformed, at so much per line.

Draftee with Cow as Dependent Claims Exemption

"Can a cow properly be classed as a dependent?" When officials of the Binghamton, N. Y., draft board are able to answer that question they will know what to do with the case of a rural registrant who listed his mother as first dependent and his cow as second. The youth explained that he has to provide hay for the cow.

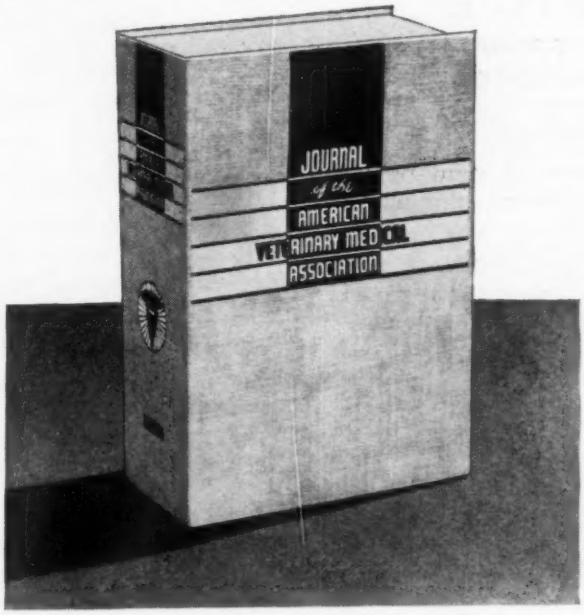
Chinchillas

Although there are but 6,000 chinchillas in the United States the breeders of this somewhat new rodent of the fur-breeding industry maintain a national association. Its name is the National Chinchilla Breeders Association. The natural home of the chinchilla is the high Andes of South America. The first chinchilla farm was in California.

Looking Forward Precarious

In 1899, when the *New York Herald* was sponsoring an automobile race (against time) from New York to San Francisco, the trip was given up as hopeless at Buffalo after the 23 days it took to get that far. Delighted at the abortive effort, the *American Veterinary Review* (Nov. 1899, p. 547) said: "The automobile has seen all the popularity it will ever enjoy." A three-

(*Continued on page xxiv*)



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Dean, Veterinary Faculty

An' Related Topics

(Continued from page xxii)

page editorial defying the automobile to replace the horse preceded this conclusion.

Animals in Air Raids

Captive wild animals in zoos have widely varying reactions to air raids, *Pathfinder* says in its column "War Side Lights."

Monkeys are upset for many hours after the bombing ceases, alligators and crocodiles roar, baby elephants cry, pigeons drop dead of heart failure or fall from their nests. Rabbits seem to be the bravest of these animals.

"Art" nowadays is a license to say things that would not be permitted in the mails in the form of the written word.

The honey bees of the United States gather annually about 170 million pounds of honey from about 50 nectar-bearing plants.

By virtue of gelatin-forming proteins, fish is more palatable when cooked in other ways than by boiling. The gelatin dissolves in hot water and much of the nutritive value is lost.—*From Subsistence Bulletin, No. 6, Quartermaster Corps, U. S. Army.*

Yucca, plant supreme for making splints because of its elasticity when wet, has another use. Ruth Appelthum, county home-demonstration agent of El Paso county, Colo., discovered that its root contains a shampoo material better than anything used by modern cosmeticians.

There were 10,500,000 acres planted to soybeans in 1939, an increase of 1,500,000 acres over the previous year. The acreage for 1935 was 5,000,000, not including the plantings seeded with another crop to increase feed or to turn under for fertilizing purposes.—*From USDA, June 2, 1940.*

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for the control of canine distemper were developed for use in combating distemper as it is found in America. They were the first specific agents developed anywhere in the world for the control of this filtrable virus disease.

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The clinical picture of the true Milk Fever case merges into that seen in cases of low serum Magnesium so that no clear-cut distinction is possible, but these cases which relapse may show a lowered serum Magnesium.

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